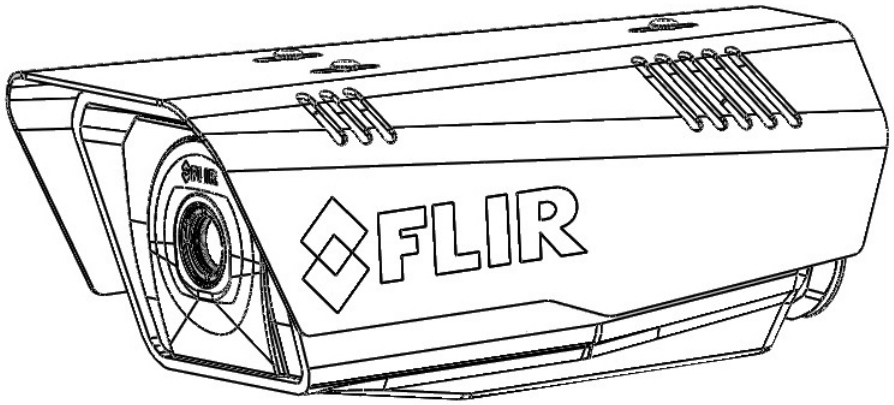
Installation Manual

FC-Series



FC-Series S
FC-Series R

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Important Instructions and Notices to the User:

Modification of this device without the express authorization of FLIR Commercial Systems, Inc. may void the user's authority under FCC rules to operate this device.

Note 1: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna;
- Increase the separation between the equipment and receiver;
- Connect the equipment into an outlet on a circuit different from that of the receiver; and/or
- Consult the dealer or an experienced radio/television technician for help.

Note 2: This equipment was tested for compliance with the FCC limits for a Class B digital device using a shielded cable for connecting the equipment to an analog video output to a monitor and using a shielded USB cable for connecting the equipment to a personal computer. When making such connections, shielded cables must be used with this equipment.

Industry Canada Notice:
This Class B digital apparatus complies with Canadian ICES-003.

Avis d'Industrie Canada:
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Proper Disposal of Electrical and Electronic Equipment (EEE)

The European Union (EU) has enacted Waste Electrical and Electronic Equipment Directive 2002/96/EC (WEEE), which aims to prevent EEE waste from arising; to encourage reuse, recycling, and recovery of EEE waste; and to promote environmental responsibility.

In accordance with these regulations, all EEE products labeled with the "crossed out wheeled bin" either on the product itself or in the product literature must not be disposed of in regular rubbish bins, mixed with regular household or other commercial waste, or by other regular municipal waste collection means. Instead, and in order to prevent possible harm to the environment or human health, all EEE products (including any cables that came with the product) should be responsibly discarded or recycled.

To identify a responsible disposal method where you live, please contact your local waste collection or recycling service, your original place of purchase or product supplier, or the responsible government authority in your area. Business users should contact their supplier or refer to their purchase contract.

Document History

Version	Date	Comment
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Image from a standard camera in low light

Image from a thermal camera in the same conditions

1 Camera Installation

This manual describes the installation and initial configuration of the FC-Series IP thermal cameras, which includes the FC-Series S and FC-Series R camera models. These camera models are similar in design and the physical mounting and installation of both models is the same. The FC-Series R cameras have all the features of the FC-Series S plus an additional Radiometry feature that provides the ability to issue alarms based on temperature. If you need help during the installation process, contact your local FLIR service representative or, call 888-747-3547 inside the US.

All installers and integrators are encouraged to take advantage of the training offered by FLIR; visit http://www.flir.com/training for more information.

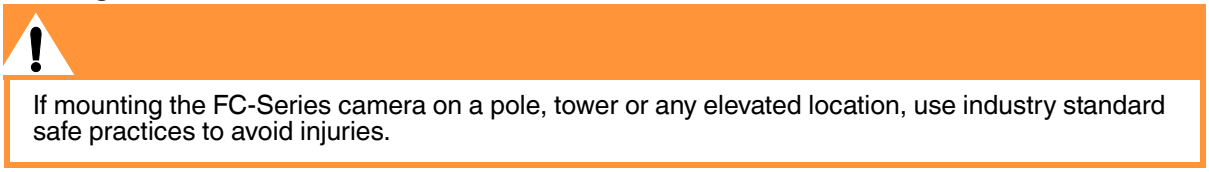
This manual includes the following topics:

- Installation overview
- Mounting the camera and its components
- Connecting the electronics
- Bench testing the camera
- Basic configuration and operation of the camera
- Camera Specifications

For safety, and to achieve the highest levels of performance from the FC-Series camera system, always follow the warnings and cautions in this manual when handling and operating the camera.

1.1 Warnings and Cautions

Warning!



If mounting the FC-Series camera on a pole, tower or any elevated location, use industry standard safe practices to avoid injuries.

Caution!

Except as described in this manual, do not open the FC-Series camera for any reason. Damage to the camera can occur as the result of careless handling or electrostatic discharge (ESD). Always handle the camera with care to avoid damage to electrostatic-sensitive components.

Prior to making any connections, ensure the power supply or circuit breaker is switched off.

Be careful not to leave fingerprints on the FC-Series camera's infrared optics.

Operating the camera outside of the specified input voltage range or the specified operating temperature range can cause permanent damage.

1.2 References

FLIR Doc # 427-00XX-XX-19S FC-Series S Interface Control Document (ICD), available on the documentation CD or from the FLIR website, provides further details regarding mechanical dimensions and mounting for the FC-Series camera.
FLIR Doc # 427-0030-00-28 *Nexus IP Camera Configuration Guide*, provides more information on setting or changing camera parameters.
These documents are provided for reference only.

1.3 Installation Overview

The FC-Series camera is an infrared thermal imaging camera intended for outdoor security applications, and can be installed in a fixed location or on a pan/tilt mechanism.The FC-Series camera is intended to be mounted on a medium-duty fixed pedestal mount or wall mount commonly used in the security industry. The camera mount must support up to 5 lbs (2.3 kg).

Cables may exit from the back of the camera housing through the supplied cable gland or from the bottom of the camera housing when using the concealed cable wall mount (sold separately). A cable gland plug is supplied for the rear of the camera housing when cables are routed using the concealed cable wall mount.

1.3.1 Camera Connection Options

The FC-Series camera can be installed with an analog or digital (IP) video output (or both). Analog video will require a connection to a video monitor or an analog video matrix switch. The camera can be powered using Power over Ethernet Plus (PoE+) or with a conventional 24 V (ac or dc) power supply. For a PoE+ connection, an accessory PoE+ power supply (PN 4132391, also called a PoE+ injector) is available if the camera is not connected to a PoE+ switch. The maximum Ethernet cable run is 100 meters including the PoE+ power supply. In installations using PoE+ power and IP video, only a single Ethernet cable from the camera is required.

In installations using analog video and conventional power (24 Vac is commonly used in many installations), an RG59U coaxial cable and a three-conductor power cable are installed. It is recommended an Ethernet cable should also be installed for camera configuration, operation and troubleshooting. The FC-Series camera does not support serial communications.

General Purpose Input/Output (GPIO)

The camera can receive a single external “contact closure” input signal and can provide a single internal “contact closure” output signal. Refer to GPIO Connections, pg. 1-10.

PoE+ Power Supplies

With PoE+, camera power is delivered to the camera via the normal Ethernet cable via the camera’s standard RJ-45 Ethernet connector. The FC-Series camera is a Powered Device compliant with the IEEE 802.3at-2009 standard, known as PoE+ or PoE Plus. The FC-Series camera is also backward compatible with the older IEEE 802.3af-2003 standard.

When connected to Power Sourcing Equipment compliant with the earlier, lower power IEEE 802.3af-2003 standard, the limited power available to the FC-Series camera will prevent the formation of frost and ice. However, the limited power available from 802.3af-2003 will not fully achieve the camera’s stated specification for de-icing from cold start when the external environment temperature is < 0 °C. In all other ways the camera will operate normally with Ethernet Powered Sourcing Equipment compliant to either IEEE PoE standard.

1.3.2 Camera Accessories

The following accessories are available for purchase from FLIR Systems, Inc.

- PoE+ power supply (PN 4132391) - For powering a single FC-Series camera using PoE+. In addition to PoE+ power and communications, the power supply provides surge protection. It complies with IEEE 802.3at and is backward compatible with the IEEE802.3af standard.
- Concealed Cable Wall Mount (PN 4129742) - Includes camera mount gasket and hex wrench for adjusting the ball joint controlling the camera's view angle.
  The FC-Series camera is attached to the mounting arm using the four M5 threaded bottom mounting holes. A cable gland plug is supplied with the camera for the rear of the camera housing when cables are routed using the concealed cable accessory. Refer to Camera Mounting with Concealed Cable Wall Mount, pg. 1-6 for installation instructions.
- Pole Mount Adapter Kit - (PN 4132982) - Adapter kit that allows the Concealed Cable Wall Mount to be mounted to a pole (75 mm [3 in] min to 180 mm [7 in]; larger pole diameter requires use of customer supplied band clamps)

1.3.3 Supplied Components

The FC-Series camera package includes these standard components:

- Fixed Camera Unit with sunshield and installed cable gland
- Cable gland plug and gland inserts for sealing camera housing
- Power terminal block plug
- Accessory terminal block plug
- Tools: 3 mm hex wrench (T-Handle), small blade screwdriver
- FC-Series Camera Documentation Package

1.3.4 Required Supplies

The installer will need to supply the following items as required (specific to the installation).

- Power cable if used for system power, 3-conductor, shielded, gauge determined by cable length and supply voltage
- PoE+ power supply or PoE+ switch if used for system power
- Cat5e Ethernet cable for digital video and/or PoE+ for system power
- Coaxial RG59U cables (BNC connector at the camera end) for analog video
- Camera grounding strap, camera mount, miscellaneous electrical hardware, connectors, and tools

Be sure to use cables that fit in the cable gland holes, as described below. Refer to Rear Access Cable Gland Sealing, pg. 1-11 for more information.

1.4 Location Considerations

The camera will require connections for power and video. Ensure that cable distances do not exceed the specifications and that cables adhere to all local and industry standards, codes, and best practices. The FC-Series camera must be mounted upright, either on top of the mounting surface. or underneath an overhanging mounting surface such as eaves or an awning. The unit should not be mounted upside down.

1.4.1 Bench Testing

Note

If the camera is to be mounted on a pole or tower or other hard-to-reach location, it may be a good idea to connect and operate the camera as a bench test at ground level prior to mounting the camera in its final location.

Connect the power, Ethernet, and video, and confirm that the video can be displayed on a monitor when the power is turned on. For configuration and basic setup information using the onboard web server, refer to Camera Bench Test, pg. 2-1 for specific details.

1.4.2 Prior to Cutting/Drilling Holes

When selecting a mounting location for the FC-Series camera, consider cable lengths and cable routing. Ensure the cables are long enough, given the proposed mounting locations and cable routing requirements, and route the cables before you install the components.

Use cables that have sufficient dimensions to ensure safety (for power cables) and adequate signal strength (for video and communications).

1.4.3 Camera Mounting for Rear Cable Access

The FC-Series camera can be secured to the mount with two in-line 1/4-20 threaded fasteners on the top or bottom of the camera. Alternatively the camera can be mounted with four M5 x 0.8 threaded fasteners to the bottom of the camera. Use Loctite 222 low strength threadlocker for the top mount fasteners (can be used with the bottom mount fasteners also). Refer to the FC-Series ICD for additional information.

If using two 1/4-20 fasteners in the center of base, the maximum depth of the fastener should not exceed 12.5 mm (0.5 in). If using four M5 x 0.8 fasteners, the maximum depth of the fastener should not exceed 10.0 mm (0.4 in).

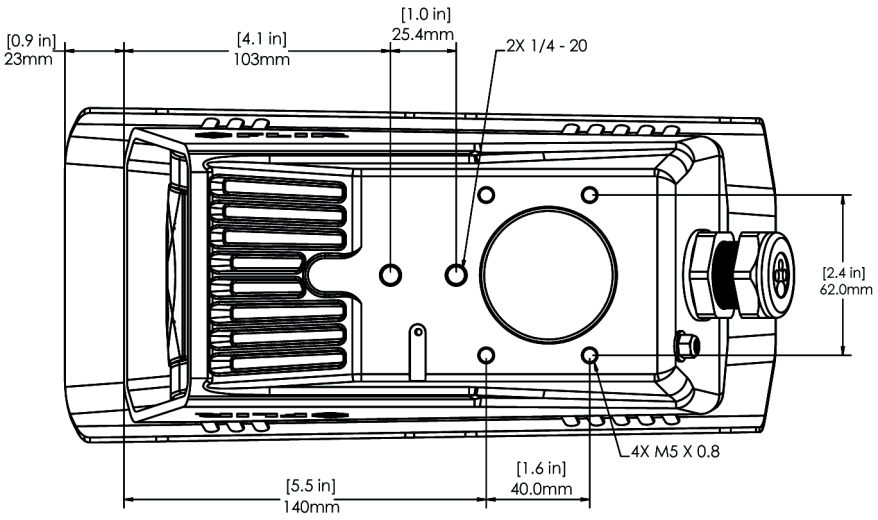


Figure 1-1: FC-Series Camera Bottom Mounting Holes

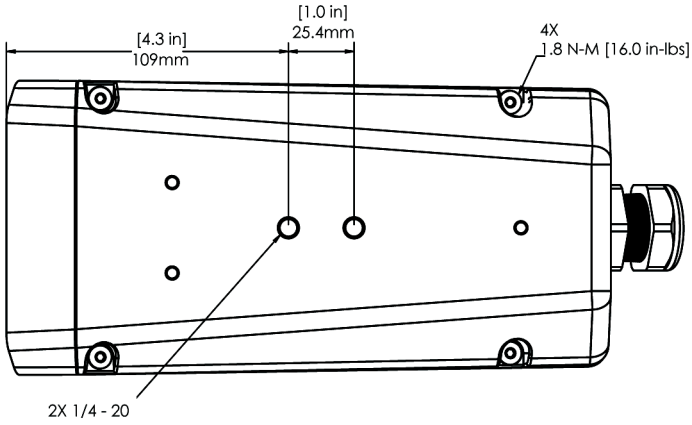


Figure 1-2: Top Side Mounting Holes

If using two 1/4-20 fasteners in the center of top, the maximum depth of the fastener should not exceed 12.5 mm (0.5 in). If the camera is mounted using the top of the camera, the sunshield must be removed.

As the diagram below indicates, be sure to allow adequate space for cable egress behind the gland. This requirement may vary, depending on the installation. Maintain the bend radius per the recommendation of the cable manufacturer. The typical cable bend radius is 50-75mm (2-3 in).

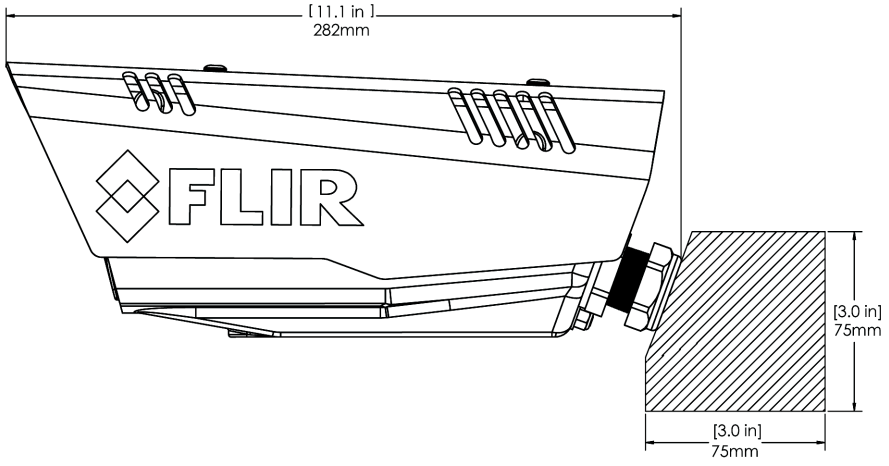


Figure 1-3: Rear Cable Bend Radius

1.4.4 Camera Mounting with Concealed Cable Wall Mount

The FC-Series camera can be secured to the optional Concealed Cable Wall Mount with four M5 x 0.8 threaded fasteners to the bottom of the camera. Use Loctite 222 low strength threadlocker for the mount fasteners. Refer to Concealed Cable Mount Accessory, pg. 1-13 for additional information.

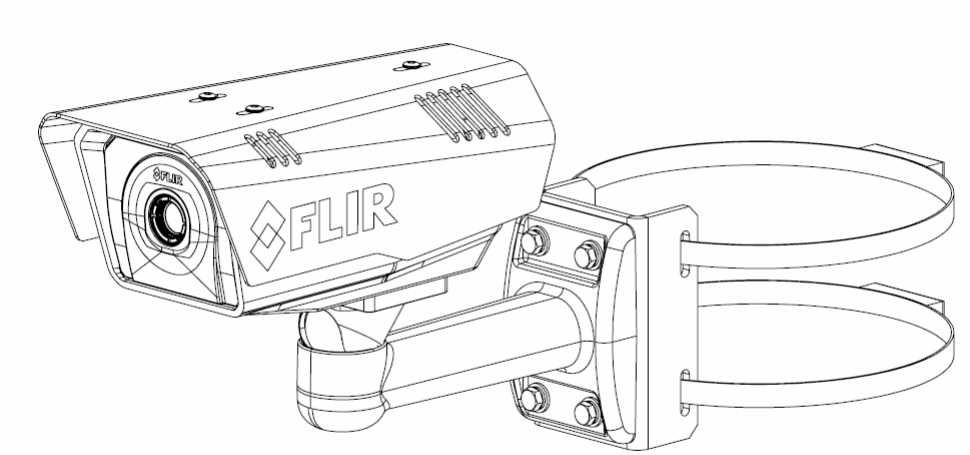


Figure 1-4: FC-Series Installed with Concealed Cable Wall Mount and Pole Adapter kit

1.4.5 Sunshield

The camera includes a sunshield which should be used for any installation where the camera is exposed to direct sunlight or precipitation, If the camera is mounted with the top mounting holes, the sunshield is not used. Depending on the needs of the installation, the sunshield can be positioned in the neutral (middle) position, or slightly forward or rearward.To change the position of the sunshield, temporarily loosen the three 3 mm hex screws on top, slide the sunshield forward or backward, and re-tighten the screws.

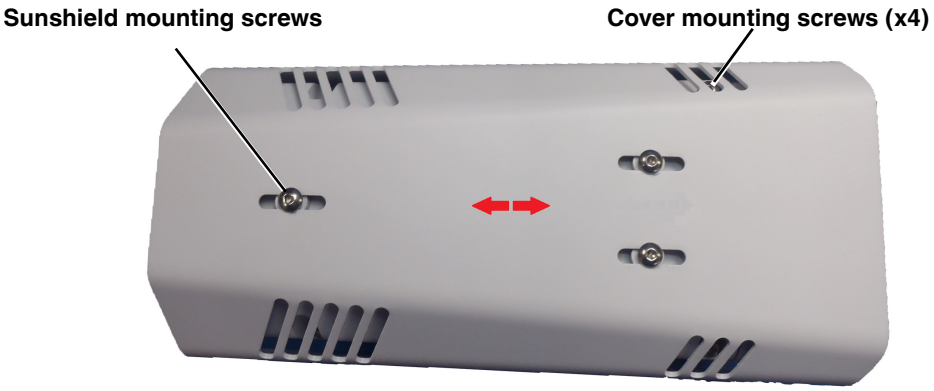


Figure 1-5: Sunshield Mounting

1.5 Removing the Cover

In order to access the electrical connections and install the cables, it is necessary to temporarily remove the top cover of the camera housing. The top cover of the camera is held in place with four 3 mm hex screws. The screws are accessible through slots in the sunshield, so the sunshield does not need to be removed from the top cover.

Use a 3 mm hex key to loosen the four captive screws, exposing the connections inside the camera enclosure. There is a grounding wire connected inside the case to the top cover, as shown. If it (or any of the grounding wires) is temporarily disconnected during the installation, it must be reconnected to ensure proper grounding of the camera.

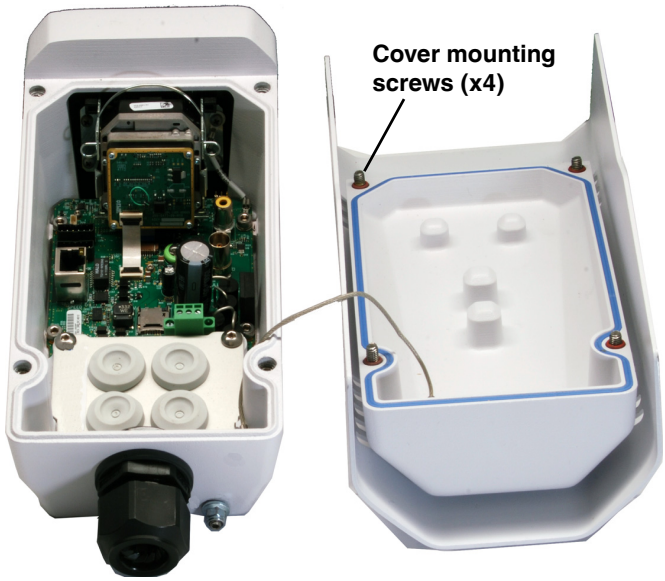


Figure 1-6: Cover Removed (Sunshield attached)

Caution!

When replacing the cover, ensure that the ground wire between the cover and the camera body is completely inside the o-ring groove. If the wire is pinched between the cover and body the camera is not sealed against water ingress and can be damaged.

Replace the cover and tighten the four 3 mm hex screws to 1.8 n-m (16.0 in-lbs).

1.6 Camera Connections

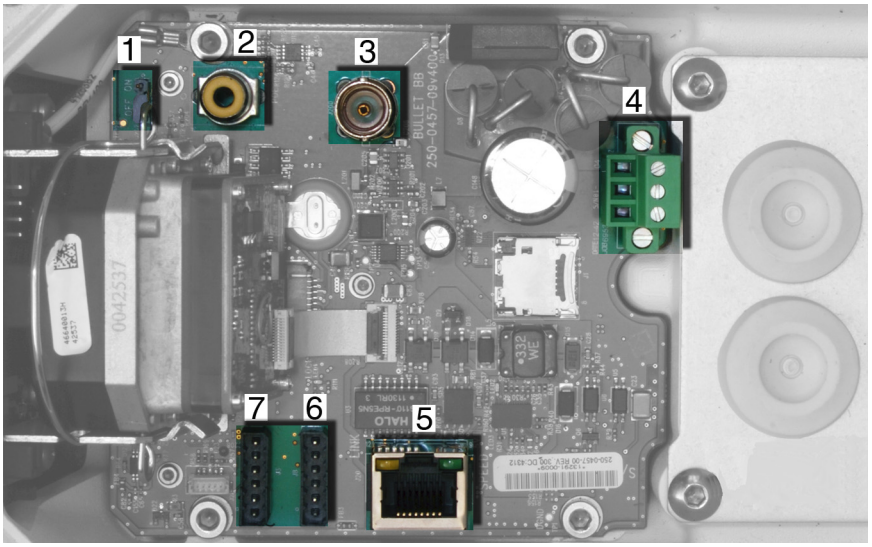


Figure 1-7: Camera Connections

Refer to Table 1-1 for a description of these camera connections.

Table 1-1: FC-Series Camera Connections

	Connection	Purpose
1	3-pin Jumper	Supplemental lens heater on/off
2	RCA	Analog video test point
3	BNC	Analog video
4	3-pin Terminal	ac/dc power
5	Ethernet	PoE+ power, communications, IP video stream
6	6-pin terminal J8	General purpose I/O
7	Accessory inputs	Reserved for future use

1.6.1 Configuring the Lens Heater Jumper

The supplemental lens heater is intended to provide lens de-icing in the rare combination of:

- A power interruption which disables the camera for an extended period, and
- Freezing rain which fully covers the lens and obstructs the image.

FLIR recommends that the supplemental lens heater be enabled only when the installation environment is such that this combination of conditions is common.

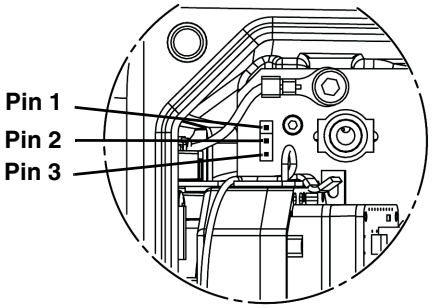


Figure 1-8: Lens Heater Jumper Setup

The FC-Series camera is shipped from the factory with the supplemental lens heater OFF (jumper pins 2 and 3). To enable the Supplemental Lens Heater, move the heater jumper to ON (jumper pins 1 and 2). Proper operation of the Supplemental Lens Heater requires that the camera be powered by 24 Vac, >16Vdc or POE+.

It is important to note that the supplemental lens heater is not required for operation in all cold temperatures. The system operates to specification and produces highest quality images without the Supplemental Lens Heater. Contact FLIR Technical Support for additional information (888-747-3547 inside the US).

1.6.2 Analog Video Connections

The primary analog video connection of the camera is a BNC connector. Alternatively, the camera also provides an RCA analog video connector. Only one or the other connection should be used on a permanent basis to ensure adequate video quality. The RCA connection allows the installer to temporarily monitor the video output, without disconnecting the primary connection.

The video cable used should be rated as RG-59/U or better to ensure a quality video signal.

Note

Insert the cables through the cable glands on the enclosure before terminating and connecting them. In general, terminated connectors will not fit through the cable gland. If a terminated cable is required, it is possible to make a clean and singular cut in the gland seal to install the cable into the gland seal.

1.6.3 Connecting Power

The camera can be powered with a conventional ac or dc power supply, rather than PoE+. Prior to making any connections, ensure the power supply or circuit breaker is switched off.

Table 1-2: Power Connections

1	Chassis
2	**Vac/dc -**
3	**Vac/dc +**

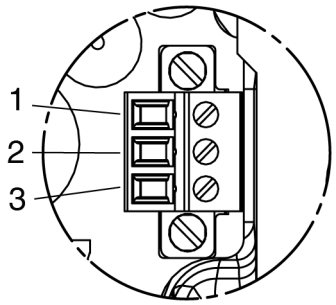


Figure 1-9: Power Connector

The power cable supplied by the installer must use wires that are sufficient size gauge for the supply voltage and length of the cable run, to ensure adequate current carrying capacity (18 AWG recommended for most installations). Always follow local building/safety codes.

Note

The terminal connector for power connections will accept 16 AWG to 24 AWG wire size.

The power connector plug may be removed for cable installation. After the plug is reattached to the board, re-tighten the screw terminals.

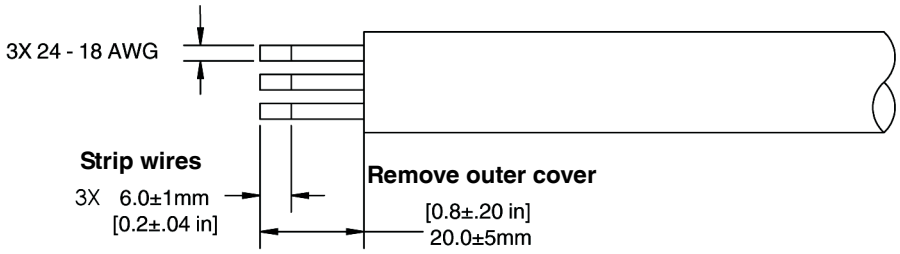


Figure 1-10: Power Cable (3 conductor)

The camera itself does not have an on/off switch. Generally the FC-Series camera may be connected to a circuit breaker and the circuit breaker will be used to apply or remove power to the camera. If power is supplied to it, the camera will be powered on and operating.

1.6.4 Ethernet

Connect a shielded cat5e/6 Ethernet cable to the RJ-45 jack. If using PoE+ to supply power to the camera, connect the other end of the Ethernet to a PoE+ switch or PoE+ injector. Otherwise connect the Ethernet to a network switch.

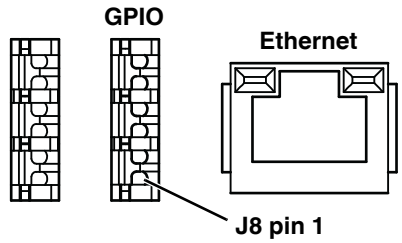


Figure 1-11: GPIO and Ethernet Connectors

1.6.5 GPIO Connections

Input Signal—The camera can receive an external input signal on accessory connector J8 pins 4 and 5 when these pins are connected by an external switch closure. Pin 5 is connected to the camera's internal +5V power supply and must not be directly connected to chassis ground. Pin 4 is connected to the internal digital ground.

While protection for static discharge has been placed on these pins, care should be used in making connections to the pins to avoid connections to other voltages or power sources outside the camera.

Output Signal—The camera can provide a contact closure output signal on accessory connector J8 pins 2 and 3 when an external voltage is supplied to these pins. When open the resistance between pins 2 and 3 is greater than 100 K ohm. When closed the resistance between pins 2 and 3 is less than 200 ohm. The maximum recommended peak voltage between the pins is 6 volts. The maximum recommended current allowed between the pins is 30 mA (0.03 A).

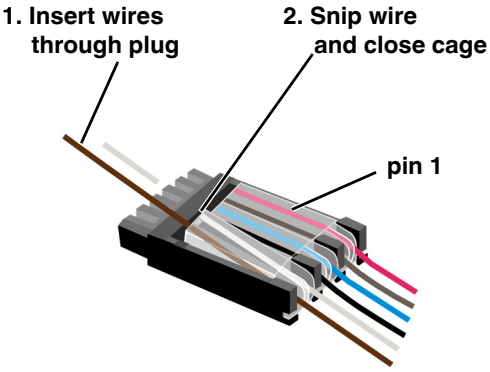


Figure 1-12: GPIO Terminal Plug

Table 1-3: GPIO Connections - J8

Pin	Connection	Notes
1	Chassis ground	
2	GPIO Out	When the camera sends an output signal, an external voltage on one pin is applied to the other pin.
3	GPIO Out	
4	Digital ground	When these pins are connected externally, the camera reads this as an input signal.
5	+5V	
6	Chassis ground	

Note

The terminal plug supplied for GPIO connections, Phoenix Contact part number 1780493 uses stranded, 26 AWG wire size (1 mm diameter including insulation) using spring-cage and pierce contact technology.

1.6.6 Camera Grounding

Ensure the camera is properly grounded. Failure to properly ground the camera can lead to permanent damage to the camera. Typical to good grounding practices, the camera chassis ground should be connected to the lowest resistance path possible. The camera has an external ground connection on the outside back of the camera. FLIR requires a grounding strap anchored to the grounding lug and connected to the nearest earth-grounding point.

If, during installation, any ground connections inside the camera are disconnected, they should be reconnected prior to closing the camera.

Figure 1-13: Camera Ground Connection

1.7 Rear Access Cable Gland Sealing

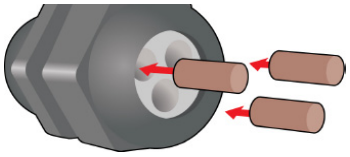
Proper installation of cable sealing gland and use of appropriate elastomer inserts is critical to long term reliability. Cables enter the rear of the camera mount enclosure through a liquid-tight compression gland.

Leave the gland nut loosened until all cable installation has been completed, and ensure the manufacturer's recommended cable bend radius is observed within the enclosure. Do not forget to tighten the cable gland seal nut to ensure a watertight seal and provide strain relief for cables.

Cable Gland Seal Inserts

The FC-Series camera comes with a single 3/4" NPT cable gland installed in the camera, with a four-hole gland seal insert. The gland includes a sealing washer and is secured to the camera with a nut on the inside of the enclosure. The gland insert has one hole for the RG-59/U analog video cable (the larger hole) and three more for a power cable, Ethernet cable, and an accessory cable (not used at this time).

Any of the holes which are not used for cables should be filled with one of the hole plugs (supplied). Install the cables through the cable gland so that the cables line up with the connections inside the camera.



Note

Insert the cables through the cable glands on the enclosure before terminating and connecting them. In general, terminated connectors will not fit through the cable gland. If a terminated cable is required, it is possible to make a clean and singular cut in the gland seal to install the cable into the gland seal.

To ensure a water tight seal when using the supplied rear cable gland, cable dimensions must be within the minimum and maximum as described in Table 1-4.

If non-standard cable diameters are used, an appropriate cable gland and insert should be used to fit the desired cable and to fit the hole in the enclosure. FLIR Systems, Inc. does not provide cable gland inserts other than the insert supplied with the system.

If a replacement is used, inspect and install the gland fitting in the back cover with suitable leak seal or sealant and tighten to ensure water tight fittings. To fit the 1.050 in. (26.7 mm) hole in the enclosure, the thread size should be 3/4" NPT or M25. The gland should be installed with a sealing washer (for example, Heyco PN 3261 or equivalent) between the gland and the external surface of the enclosure.

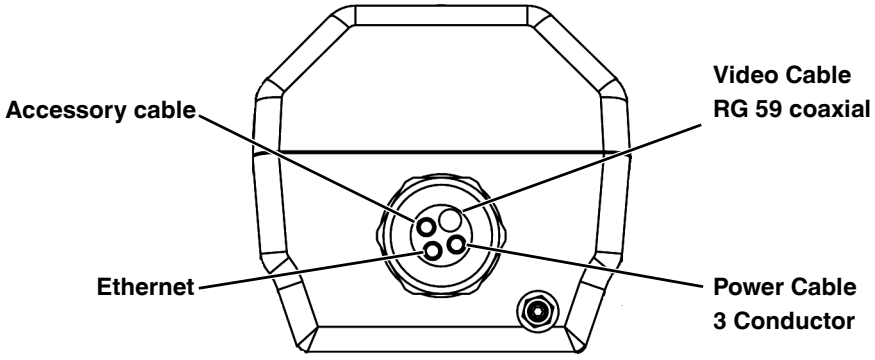


Figure 1-14: Cable Routing

Table 1-4: Rear Exit Cable Min/Max Dimensions

Cable	Minimum	Maximum	Notes
Power (3 conductor), Ethernet, Accessory cables	4.5 mm [0.178 in]	5.2 mm [0.205 in]	When using the concealed cable wall mount (PN 4129742), cables can have a maximum diameter of 10 mm [0.394 in]
RG 59 Video cable	5.3 mm [0.209 in]	6.4 mm [0.245 in]	

1.8 Concealed Cable Mount Accessory

Do not route cables through the bottom of the camera unless the concealed cable wall mount (PN 4129742) is used. The wall mount is specifically designed for the camera and allows the opening to seal properly. When using the concealed cable wall mount, cable dimensions must be within the minimum and maximum as described in Table 1-5.

Table 1-5: Cable Min/Max Dimensions using Concealed Cable Wall Mount (PN 4129742)

Cable	Minimum	Maximum	Notes
Power (3 conductor), Ethernet, Accessory cables	4.5 mm [0.178 in]	10 mm [0.394 in]	When using the rear exit cable gland, the maximum diameter is 5.2 mm [0.205 in]
RG 59 Video cable	5.3 mm [0.209 in]	10 mm [0.394 in]	

Proper installation of the seal plate and panel mount gland seals is critical to long term reliability. Cables enter the bottom of the camera enclosure through the seal plate and panel mount glands. Be sure to insert each cable through its panel mount gland on the seal plate before terminating them (connectors will not fit through the gland). Ensure the manufacturer's recommended cable bend radius is not exceeded within the enclosure.

Prepare the Camera

Step 1 Use a 3 mm hex key to loosen the four captive screws and remove the top cover as described above.

Step 2 Remove the rear cable gland and replace it with the cable gland plug. Use the gasket and nut that were removed with the cable gland.

Step 3 Use a 3 mm hex key to loosen the four captive screws and remove the seal plate, o-ring, and plug.

Figure 1-16: Removed Parts

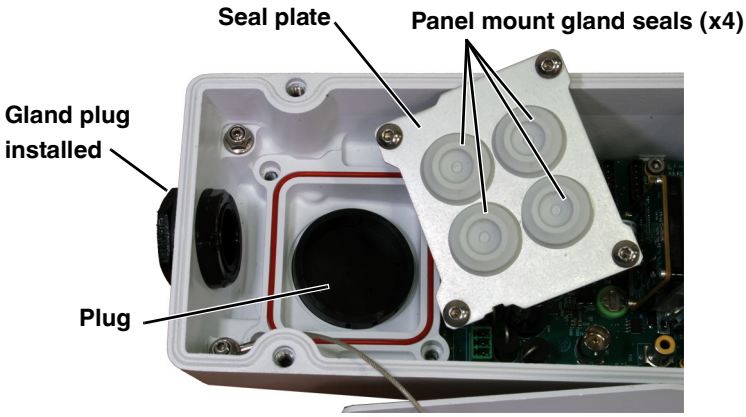


Figure 1-15: Seal Plate Removed

Step 4 Install the wall mount (PN 4129742) to the wall and pull the cable(s) through the mount. Cut a small cross-slit in the black mount gasket and push the cable(s) through the gasket. Pull the cable(s) through the opening in the bottom of the camera. A single Ethernet cable is shown in the images.

Step 5 Secure the camera to the mount using four M5 x 0.8 threaded fasteners to the bottom of the camera. Use Loctite 222 low strength thread locker for the mount fasteners.

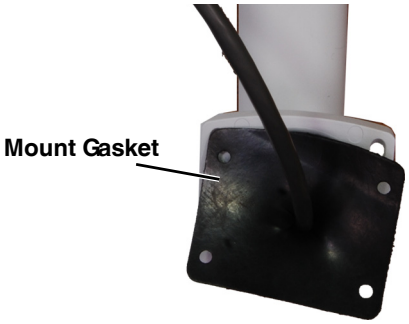


Figure 1-17: Camera Mount

Step 6 As needed, clean the o-ring and the o-ring groove in the bottom of the camera using isotropy alcohol and press the o-ring into its groove.

Step 7 For each cable, punch hole in the center of a gland seal from the top using the 3 mm hex key. Insert the cable from the bottom though the hole.

Step 8 Place the gland plate back into position and tighten the four 3 mm captive screws using a torque value of 1.8 n-m (16.0 in-lbs).

Step 9 Check the length of each cable to ensure an appropriate bend radius and terminate the cable.

Step 10 Push the cable back through the gland seal so that the seal is extended down not up, as shown in the illustration below.

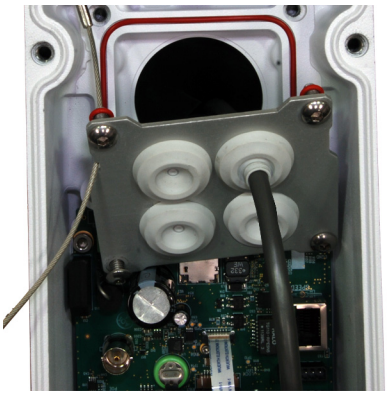
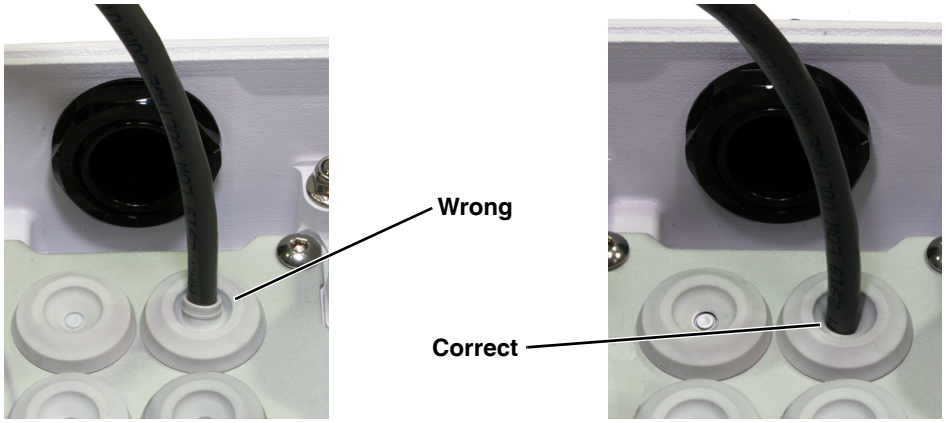


Figure 1-18: Cable through Seal Plate



Step 11 Connect the cables as indicated in Figure 1-7 on page 1-7. Ensure that any ground wire that was removed during installation is reconnected. Replace the cover and tighten the four 3 mm hex screws to 1.8 n-m (16.0 in-lbs).

Caution!

When replacing the cover, make sure the ground wire between the cover and the camera body is completely inside the o-ring groove. If the wire is pinched between the cover and the base, the camera will not be sealed against water ingress and could be damaged.

Step 12 Using the hex key that is included with the concealed cable mount, loosen the ball joint on the bottom of the mount, position the camera as required, and then re-tighten the ball joint.

1.9 Camera specifications

Camera Models	FC-Series S, FC-Series R
Camera Platform Type	Fixed
Composite Video	NTSC or PAL
Thermal Camera	
Array Format	324x256 (25 µm pixel pitch) 336x256, 640x480 (17 µm pixel pitch)
Detector Type	Long-Life, Uncooled VOx Microbolometer
Effective Resolution	76,800
Field Of View (Focal Length) for available FC-Series S camera lens configurations.	FC-363 S = 63° × 50° (7.5 mm) FC-348 S = 48° × 39° (9 mm) FC-334 S = 34° × 28° (13 mm) FC-324 S = 24° × 19° (19 mm) FC-313 S = 13° × 10° (35 mm) FC-309 S = 9° × 8° (35 mm) FC-690 S = 90° × 69° (7.5 mm) FC-669 S = 69° × 56° (9 mm) FC-645 S = 45° × 37° (13 mm) FC-632 S = 32° × 26° (19 mm) FC-618 S = 18° × 14° (35 mm)
Field Of View (Focal Length) for available FC-Series R camera lens configurations.	FC-334 R = 34° × 28° (13 mm) FC-324 R = 24° × 19° (19 mm) FC-645 R = 45° × 37° (13 mm) FC-632 R = 32° × 26° (19 mm)
Spectral Range	7.5 to 13.5 µm
Lens	Athermalized, focus-free
General	
Weight	4.8 lb (2.2 kg) with sun shield
Dimensions (L,W,H)	11.1" x 5.1" x 4.5" with sunshield, (282 mm x 129 mm x 115 mm)
Input Voltage - dc	14 - 32 Vdc
Input Voltage - ac	18 - 27 Vac
Input Voltage - PoE+	IEEE 802.3af-2003 standard or higher power, IEEE 802.3at-2009 standard
Power Consumption	5 W nominal at 24 Vdc 8 VA nominal at 24 Vac Peak at 24 Vdc: 21 W with supplemental lens heater Peak at 24 Vac: 29 VA with supplemental lens heater
Mounting Provisions	Two 1/4-20” threaded holes on top and bottom, 1" spacing along center line front to back. Four M5 threaded holes bottom, 40 mm x 62 mm (1.6 in x 2.4 in) spacing square.
Shipping weight	6.1 lbs (2.8 kg)

Shipping Dimensions	14.375”(L) x 7.375”(W) x 7”(H)
Environmental	
IP rating (dust and water ingress)	IP66 & IP67
Operating temperature range	-50 °C to 70 °C (-58 °F to 158 °F) continuous -40 °C to 70 °C (-40 °F to 158 °F) cold start
Storage Temperature range	-55 °C to 85 °C (-67 °F to 185 °F)
Humidity	0-95% relative
Shock	IEC 60068-2-27 10 g shock pulse with a 11ms half-sine profile
Vibration	MIL-STD-810F
Approvals	FCC Part15, Subpart B, Class B, EN 55022 Class B, EN 50130-4, EN60950

2 Basic Operation and Configuration

The camera has an Ethernet connection that allows streaming video over an IP network as well as configuration and control of the camera[1]. It is possible to stream video and control the camera as it is from the factory, without making any configuration changes. However in most cases the camera will have at least some configuration changes to allow it to connect with other devices on the existing network.

Once the camera is connected to a network and powered on, the user can choose to use either the FLIR Sensors Manager (FSM) software or a web browser[2] to view the video and control the camera. The FSM software is included with the camera. Refer to the FSM User Manual for details about using the software; the manual is available from the Windows Start menu once the software is installed.

Getting the camera IP interface set up and working may require a level of familiarity with managing IP networks that is new to many security professionals. Prior to configuring the IP interface and streaming video parameters, make sure you know how to manage and configure the other equipment in the network (for example, any PC or device that will connect to the camera, any router or firewall that will carry the IP traffic, and so on). FLIR technical support can only provide limited support in this regard.

2.1 Basic Test and Configuration Steps

Assuming the existing network uses IP addresses that are unique and different than the default address on the camera, configuring the camera for IP communications generally involves the following steps:

Step 1 Connect the Ethernet port to an IP network that is isolated from the existing camera network (for example, a standalone switch)

Step 2 Connect a PC or laptop to the same network

Step 3 Temporarily set the IP address of the PC or laptop to be compatible with the factory network address of the camera (for example, 192.168.250.1)

Step 4 Perform a bench test of the camera using a web browser or FSM, prior to making any parameter changes (this step is optional but recommended)

Step 5 Configure the camera settings, such as IP address, camera date/time, security settings, and video stream parameters, so the camera is compatible with the existing network equipment

Step 6 Save the configuration changes and restart the server

Step 7 Connect the camera to the existing network and test the camera

Step 8 Make a backup of the new configuration

2.2 Camera Bench Test

The camera offers both analog video and IP video, and since the camera can be powered by PoE+ or by a conventional power supply, there are several ways to bench test the camera. It is recommended that the installer test the camera using the same type of connections as in the final installation.

Even if using analog video and conventional power in the final installation, it is a good idea to test the IP communications when performing the bench test. If any image adjustments are necessary, they can be done using a web browser over the IP connection, and saved as power-on default settings.

1. For this chapter, it is assumed the camera will be connected to a network via Ethernet. For installations that use only analog video output, it is not possible to make configuration changes unless an Ethernet connection is also used.
2. The web interface is supported on Microsoft Internet Explorer version 9, as well as the latest versions of Google Chrome and Mozilla Firefox.

With the camera powered up, analog video can be tested at either the BNC connector or the RCA connector. Connect the camera to a video monitor and confirm the live video is displayed on the monitor.

If using a conventional power supply, connect the camera to a network switch with an Ethernet cable, and connect a PC or laptop to the switch also. Use a web browser to access and test the camera as described below, and if necessary make configuration changes prior to installation.

2.3 Web Browser Interface

The FC-Series camera is shipped with an IP address set to 192.168.250.116. Set the PC or laptop network adapter to a compatible IP address, for example: 192.168.250.1 with a netmask of 255.255.255.0. If you are unsure how to set the IP address on the PC or laptop, refer to Setting the IP address on a Windows PC, pg. 2-19.

Use a web browser to connect to the camera as described below, and confirm it is streaming video. Once the bench test is complete, use the web browser to make configuration changes as needed (for example, set the IP address to an address that is compatible with the existing network). It is also a good idea to run the FSM software and confirm it is working with the camera as expected.

It is possible to log in to the camera using one of three User Names: **user**, **expert**, and **admin**. By default, the passwords are: **user**, **expert**, and **fliradmin**, respectively. The **user** login can be used to do the initial bench test of the camera. The **expert** login may be used to make configuration changes such as setting the IP address. The login passwords should be changed to prevent unauthorized log ins. To change the passwords, refer to Basic Camera Configuration, pg. 2-6.

Note

Two web sessions can be active at once. An inactive session will be stopped after 20 minutes.

Log in to the Camera Web Page

Step 1 Open a web browser and enter: http:\\192.168.250.116. The login screen with a picture of the camera will appear.

Step 2 Enter **user** for the User Name and **user** for the Password, and click Log in.

Figure 2-1: Camera Web Page Login Screen

2.3.1 Live Video Page

The **Live Video** page will be displayed, with a live image from the camera on the left part of the screen. Next to the FLIR logo along the top of the screen are some menu choices, including **Live Video** (the red text indicates it is selected), **Help**, and **Log out**. The **expert** and **admin** logins will see additional menu choices.

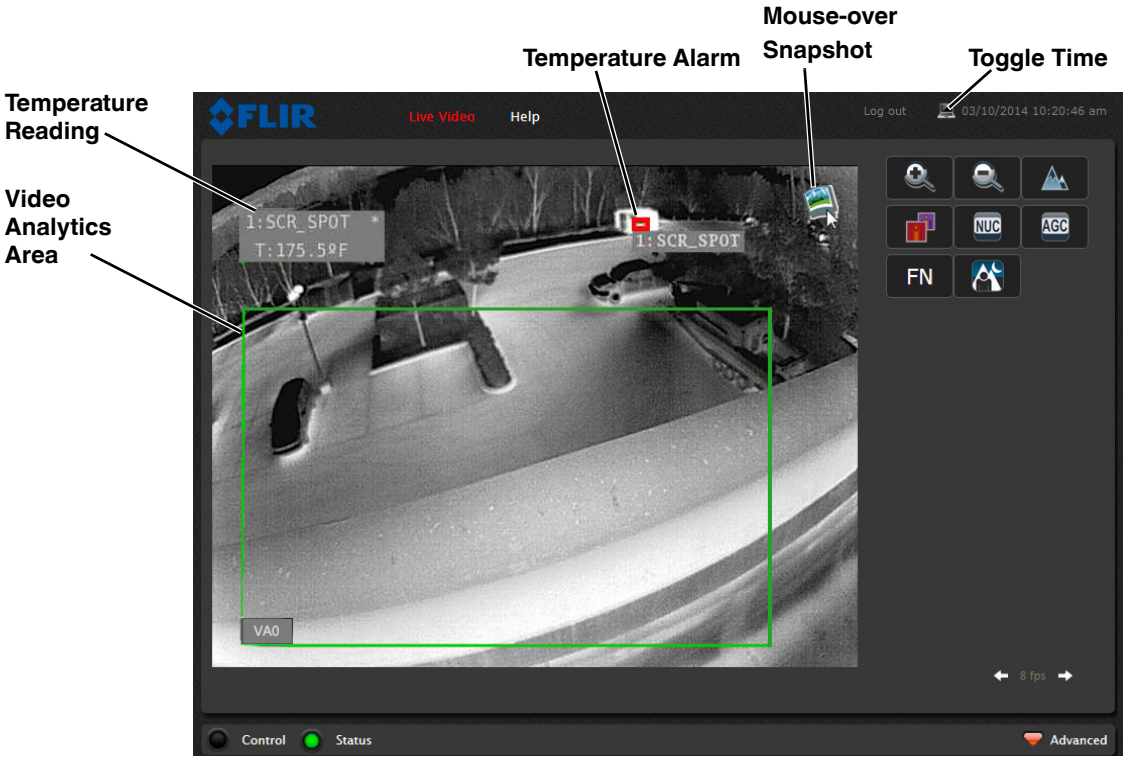


Figure 2-2: Live Video Web Page

If the live video is not displayed, refer to Troubleshooting Tips, pg. 2-14. In the lower right of the web page there is a frame rate selector. This selector allows the user to change the rate at which the frames are displayed in the browser. This rate controls the user's own web browser only, and does not affect the video streams to other users or to an NVR.

Help

At the top of the page, the **Help** menu displays software version information. This page has information about the camera including hardware and software revision numbers, part numbers, and serial numbers. If it is necessary to contact FLIR Technical Support for assistance, it will be helpful to have the information from this page (such as Software Version) on hand.

Log out

Use this button to disconnect from the camera and stop the display of the video stream. If a web session is inactive for 20 minutes, it will be stopped and you will have to log in again.

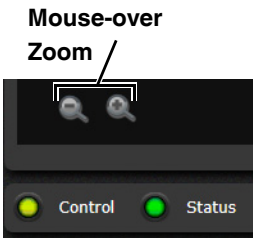
Toggle Camera/PC time

Use this button to view either your PC time or the camera time.

Temperature—FC-Series R camera only

The FC-Series R camera can provide temperature measurements, the precision of which depend on many factors, including the ambient temperature, the distance to the object, and emissivity, an indication of how well a particular material radiates energy. By default, box and spot measurement areas are setup near the center of the video image to alarm near 90 °F (body temperature). Refer to Temperature Monitoring Setup (FC-Series R camera only), pg. 3-7.

Camera Control and Status



In the lower left of the screen are two indicator lights: Control and Status. Initially the Control light is off, as in the image above, indicating the user is not able to control the camera. When multiple users are connected to a camera, only one user at a time can issue commands to the camera. If another user has control of the camera, the Control light is yellow. A user is able to request control of the camera by clicking on the yellow or black light, or simply by sending a command to the camera. The Status light may turn off temporarily while waiting for the response from the camera. Be patient, there may be a slight delay between each command while the browser waits for a response from the camera.

In addition, when the cursor is moved over the video, there are mouse-over zoom buttons and a mouse-over snapshot button. The zoom buttons appear in the lower left of the screen; the snapshot button appears in the upper right of the screen. After clicking the snapshot button, the video image is saved as a .jpg file and the browser will provide prompts depending on which browser is being used.

Web Control Panel

The control buttons on the right side of the page provide a way to control the camera in a limited number of ways. When the mouse cursor is positioned over a button, a tool tip is displayed.

This same web interface is used with various FLIR thermal cameras—some are fixed, such as the FC-Series cameras, and some are pan/tilt cameras. As a result, different buttons in the control panel will appear for different FLIR cameras.

The following buttons appear for the FC-Series cameras:

Digital Zoom

These buttons zoom the displayed video. The zoom state (and other camera settings) can be saved in the IR Setup page (refer to Save Settings, pg. 3-3). This will allow the camera to retain the desired zoom state (field of view) after the power is cycled.

Toggle Polarity

This button changes the polarity of the assigned colors to the different temperatures in a scene. In the black and white palette for example, hot objects are displayed as white and cold objects as black, or vice versa.

Toggle Palette

This button causes the camera to cycle through six different look up table (LUT) color palettes. Depending on the subjects viewed, one color palette may be preferable to the others. The Toggle Polarity button allows access to six more palettes (refer to Misc. (Lookup Table), pg. 3-3).

Perform IR NUC Calibration

This button causes the camera to perform a Non-Uniformity Correction operation (refer to Image freezes momentarily, pg. 2-14).

Toggle Automatic Gain Control (AGC)

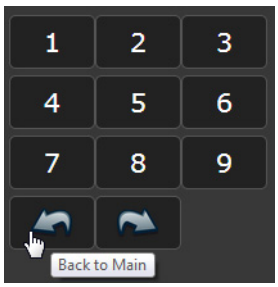
This button causes the camera to cycle through 5 different AGC options that use a combination of settings to produce different configurations that could improve the video image for a given set of conditions.

Toggle Scene Preset

This button causes the camera to cycle through 5 different image settings. The Scene Presets cause the image brightness and contrast to adjust. Depending on the time of day, weather, and other conditions, one Scene Preset may be preferable to the others.

Function

The FC-Series cameras have additional features or functions which can be accessed using an extra numeric function keypad. It is possible to create customized camera functions through a “macro” interface which can be programmed through XML commands. Contact FLIR Technical Support for information about the Nexus XML-Based Control Interfaces.



When the Function button is selected, the keypad changes to a numeric keypad providing programmed functions (1 - 9). Select the back arrow to return to the main keypad. Some specific cameras can have additional functions (10 - 18). The forward arrow will access these.

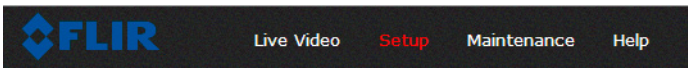
Refer to the following table for definitions of the nine functions available to FC-Series cameras. The video enhancing options in some cases may improve the video image, at least temporarily. Over time or as the environment changes, the scene could change and the resulting image may no longer be optimal.

FN	Function	Description
1	Enable EE	Edge enhancement (EE) is an image processing technique that enhances details by emphasizing lines and edges. It may be possible to see fine details more easily in some scenes, but it could also make the image somewhat more grainy or pixilated.
2	Disable EE	
3	SAL-DRE Global	The Scene Adaptive Local Dynamic Range Enhancement (SAL-DRE) algorithm may improve the dynamic range of some scenes by adaptive tone mapping such that the contents in both the dark and bright regions are visible.
4	SAL-DRE Local	
5	SAL-DRE Off	
6	SAL-DRE Low	
7	SAL-DRE Medium	
8	SAL-DRE High	
9	Send Test Email	An email will be sent to the default email list as configured in the Notification Lists using the SMTP server defined in Msg Systems (refer to Msg Systems, pg. 2-9). The email will have simply “Test” in the Subject and “FC-Series Test Email” in the message body.

2.4 Basic Camera Configuration

The following procedures describe how to do the most common bench test camera configuration steps, such as setting the camera IP address and hostname and changing the user password. To make these changes, it is necessary to login using the **expert** user account. Additional setup and configuration options required after the camera has been installed in its final location are described after the basic steps are given, refer to Advanced Configuration, pg. 3-1.

2.4.1 Setup Menu

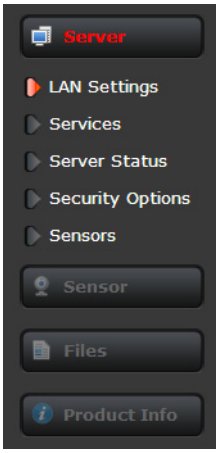


The **Setup** menu is used for GEO Settings (Latitude and Longitude, for example), thermal (IR) camera settings, defining Video Analytics motion detection zones, and setting Radiometry temperature measurement areas (FC-Series R only), refer to Setup Menu, pg. 3-1.

Adjustments to the IR settings should only be made by someone who has expertise with thermal cameras and a thorough understanding of how the various settings affect the image. In most installations, the only camera settings needed are available from the Web Control panel on the Live Video page (Scene Presets, Polarity, Palettes, AGC, and zoom). Haphazard changes can lead to image problems including a complete loss of video. Additional information is provided in Thermal Image Setup, pg. 3-2.

When a user logs in as **admin**, a complete **Maintenance** menu is available (refer to Global Settings, pg. 3-10). The **Maintenance** menu also provides access to other configuration options. For more information on setting or changing other camera parameters refer to the *Nexus IP Camera Configuration Guide* (FLIR Doc #427-0030-00-28).

2.4.2 Server Menu



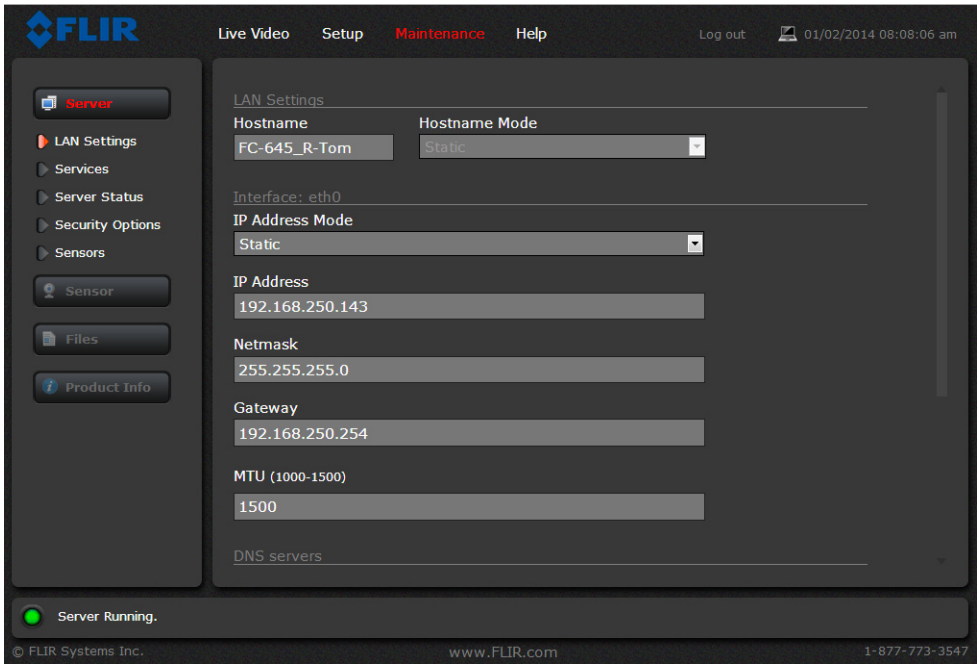
When a user logs in as **expert**, the **Maintenance Server** menus are available. When the **Server** menu is selected, the **LAN Settings** page appears.

In order to make some configuration changes through the **Maintenance** menu, it is necessary to save the changes, then stop and restart the server to make the changes take effect[3].

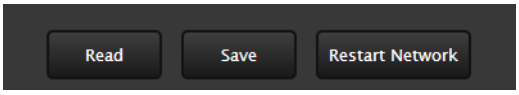
The basic camera configuration steps are accessed through the **Maintenance Server** menu, using the menus on the left side of the page. The **LAN Settings**, **Services**, and **Security Options** selections are described below. The **expert** login has access to these **Server** pages, but will only see the security settings for the user login.

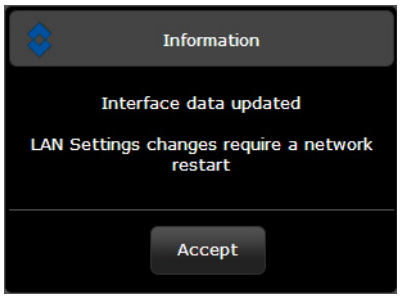
3. When making configuration changes using the **Setup** page, most of the changes take effect immediately, and it is not necessary to start and stop the server. However it is necessary to save the changes (with the Save Settings button at the bottom of the page) if it is desirable to use the new settings as a default when the camera is powered on.

LAN Settings: The **LAN Settings** page can be used to set the hostname, default gateway, and IP address for the camera. A more descriptive Friendly Name (used by FSM) can be set from the Product Info page with the admin login. The default IP Address mode is static; the mode can also be set to DHCP.



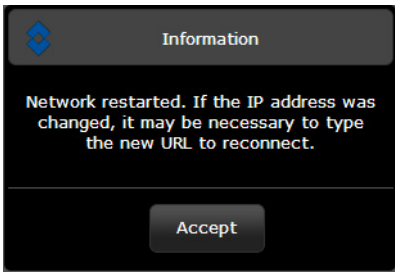
When the LAN settings are changed and the Save button is clicked, a pop-up message will appear to indicate the network interface must be restarted.





Once the IP address of the camera is changed, the PC may no longer be on the same network and therefore may not be able to access the camera until the IP address on the PC is changed also. For that reason, you may wish to change the IP address after making other configuration changes.

To reset the IP address to the factory default using a loopback connector, refer to Restoring the Factory Settings, pg. 3-26.

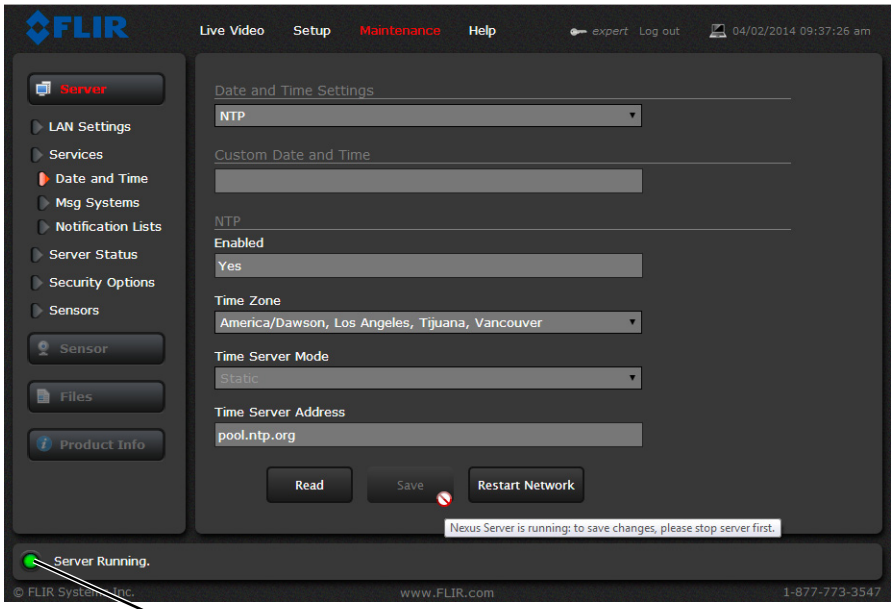


Note

The IP address is temporarily displayed on the analog video after the camera finishes its boot cycle. If you are unsure of the camera IP address, it is useful to reboot the camera and watch for the IP Address information after the camera boots up (usually about 90 seconds after power is applied).

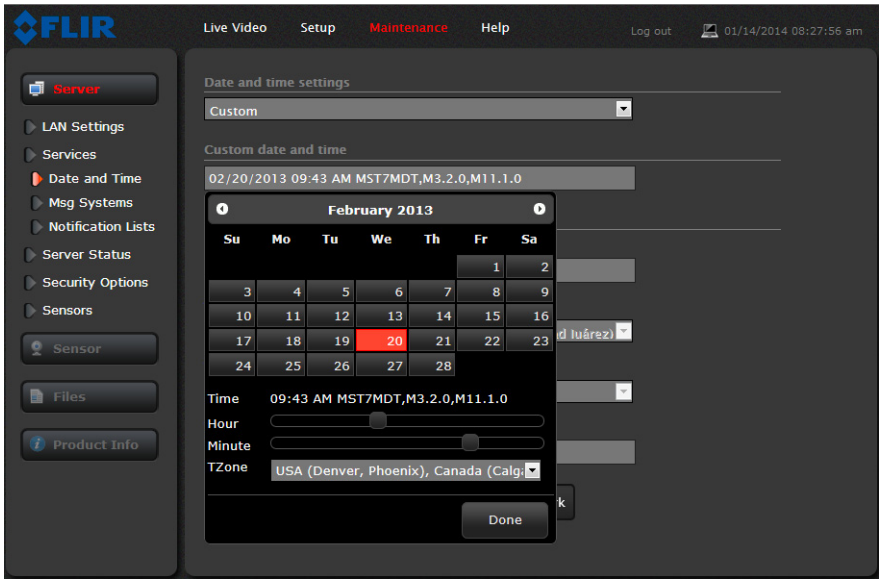
Services Menu

Date and Time: The **Date and Time** settings page is used to configure the date and time settings. The date, time, and time zone can be obtained from an NTP server, or can be entered manually. If NTP mode is selected, the NTP server information can be entered. The Nexus server must be stopped before changes can be saved. After saving changes, it is necessary to restart the server to make them effective.



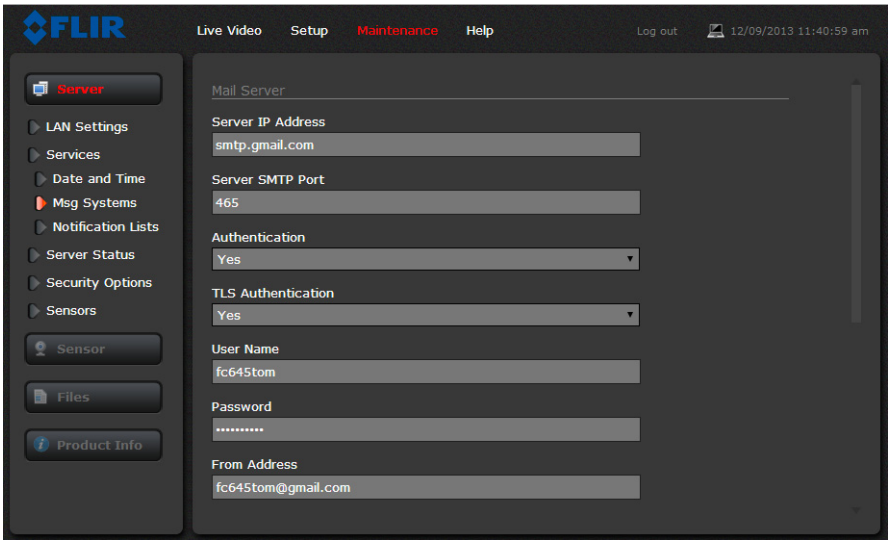
Toggle Server (Stop/Start)

If the Custom mode is selected, a pop-up window allows the information to be entered manually.



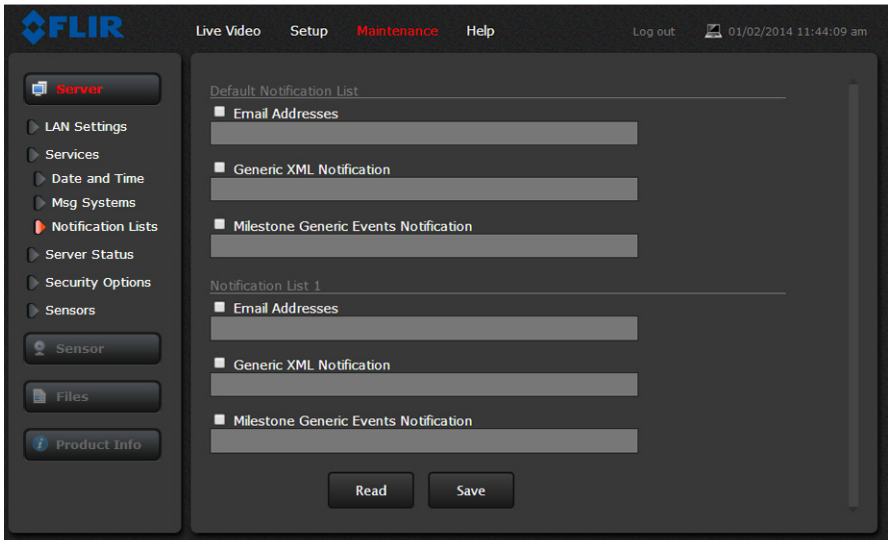
Set the date and time parameters, then select the Save button at the bottom of the page.

Msg Systems: Use the **Msg Systems** page to setup a connection to a mail server to send outgoing email notifications.



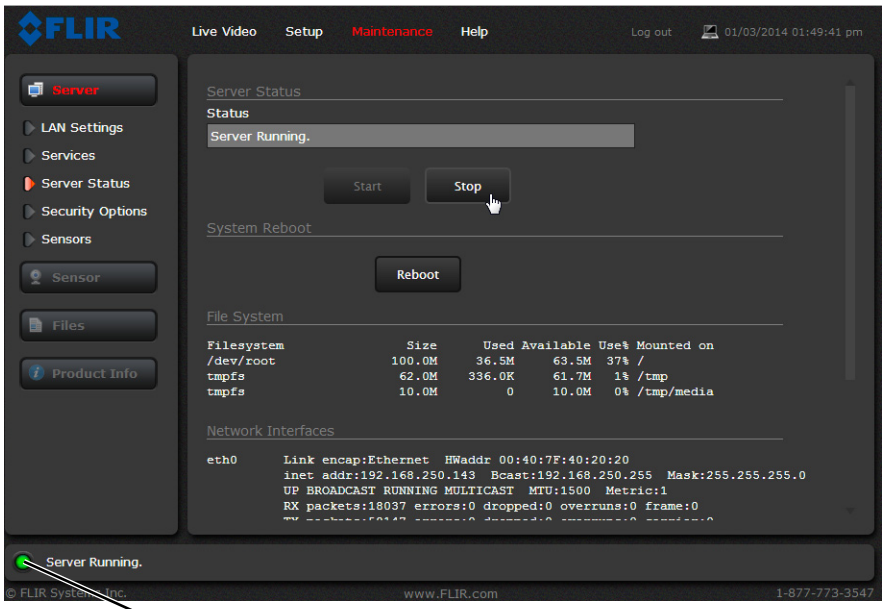
Ensure Gateway and DNS servers are supplied. Refer to LAN Settings, pg. 2-7. Configure the Msg Systems page with mail server information then click Save.

Notification Lists: Use this page to setup multiple email addresses and other notifications that can be sent as a result of alarms being processed by the Alarm Manager.



The email address entered into the Default Notification List will be used to send a test email (FN 9) from the Live Video page.

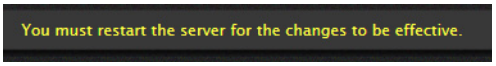
Server Status: The **Server Status** page provides an indication of the current server status (either running or stopped) and buttons for starting or stopping the server or for rebooting the system.



Toggle Server (Stop/Start)

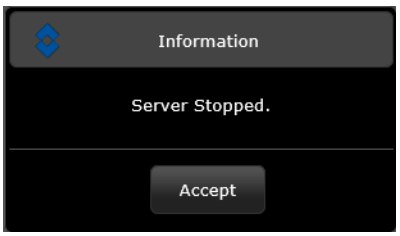
After making configuration changes, it is necessary to save the changes to the server (there is a Save button at the bottom of each configuration page). The configuration changes do not take effect immediately. Generally, it is also necessary to stop and restart the server for the changes to become effective. The server has a configuration that is active and running, and another configuration that is saved (and possibly different than the running configuration).

The message at the bottom of the page indicates the saved configuration is different than the active (running) configuration, and it is necessary to restart the server.

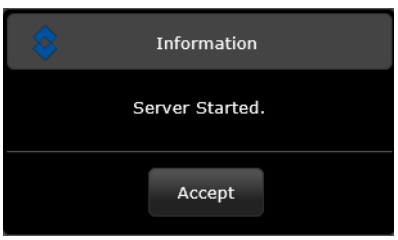


It may take up to 20 seconds or more to stop the server, especially when there are multiple video streams open. Be patient when stopping the server.

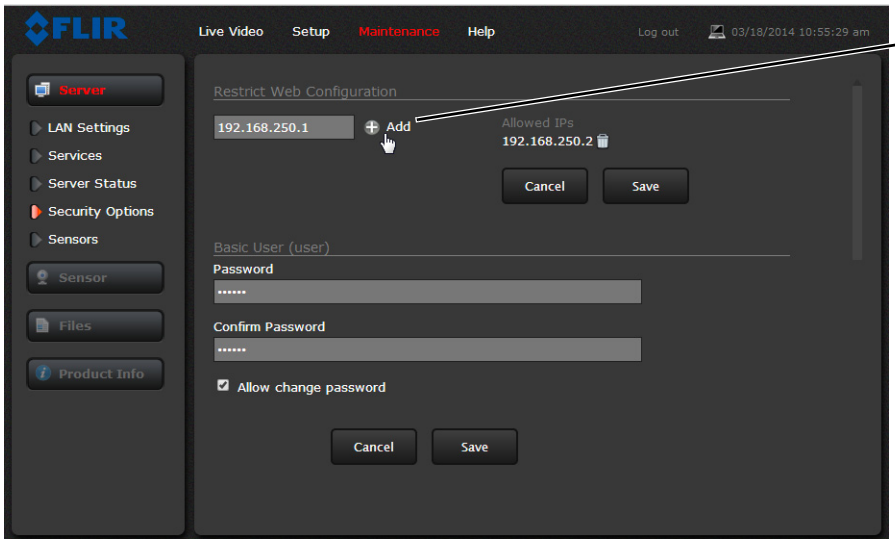
When the server is stopped and the page is refreshed, the status will show as “Server Stopped.” and the Start button will be enabled rather than Stop.



Click on the Start button to restart the server, and when the page refreshes, the status will again show as “Server Running…”. The Start button will be replaced by a Stop button when the startup procedure has completed.



Security Options: Use the **Security Options** page to restrict access through the camera web server to specific IP addresses and to set and change passwords. As shown below, the **expert** login can only configure the **user** login password.

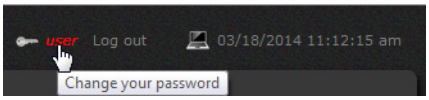


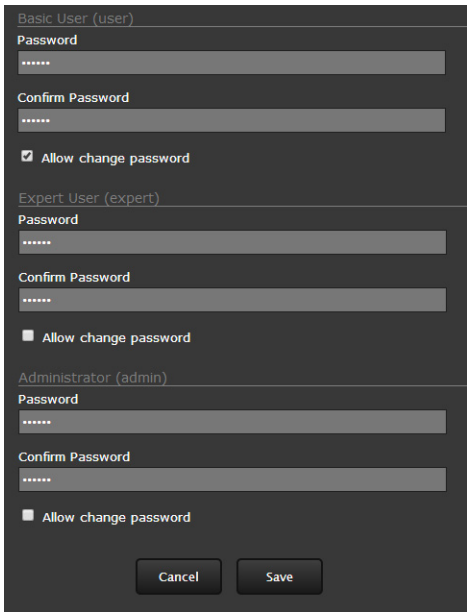
As an additional security measure, limit which computers have access to the web browser interface. Simply add a computer's IP address and click Add. After all the allowed IP addresses are entered, select the Save button to save the changes.

To maintain security of your systems set passwords for each of the three login accounts (requires the **admin** login).
user—The user account can only use the **Live Video** screen and controls.
expert—The expert account can use the **Live Video** screen, the camera **Setup** screen, and the Server pages on the **Maintenance** screen.
admin—The admin account can use all screens.

After a password is set and confirmed, select the Save button at the bottom (scroll down the page, if necessary).

Selecting the Allow Change Password check box will allow that login to change their own password from an icon at the top of all pages.





2.5 Thermal Imaging Overview

When power is applied to the FC-Series camera, a FLIR splash screen is displayed for less than two seconds, and then the camera outputs the live video image. No operator action or intervention is required and no configuration of the camera is necessary.

Figure 2-3: Splash Screen

The thermal camera makes an image based on temperature differences. In the thermal image, by default the hottest item in the scene appears as white and the coldest item is black, and all other items are represented as a gray scale value between white and black.

It may take some time to get used to the thermal imagery from the camera, especially for someone who only has experience with normal daylight cameras. Having a basic understanding of the differences between thermal and daylight cameras can help with getting the best performance from the thermal camera.

Both thermal and daylight cameras have detectors (pixels) that detect energy. One difference between thermal and daylight cameras has to do with where the energy comes from to create an image. When viewing an image with an ordinary camera, there has to be some source of visible light (something hot, such as the sun or lights) that reflects off the objects in the scene to the camera. The same is true with human eyesight; the vast majority of what people see is based on **reflected** light energy.

On the other hand, the thermal camera detects energy that is **directly radiated** from objects in the scene. Most objects in typical surroundings are not hot enough to radiate visible light, but they easily radiate the type of infrared energy that the thermal camera can detect. Even very cold objects, like ice and snow, radiate this type of energy.

The camera is capable of sensing very small temperature differences, and produces a video image that typically has dramatic contrast in comparison to daylight cameras. This high contrast level from the thermal video enables intelligent video analytic software to perform more reliably.

The performance of the camera will likely vary throughout the day. After sunset, objects warmed by the sun will appear warmest. Early in the morning, many of these objects will appear cooler than their surroundings, so be sure to look for subtle differences in the scene, as opposed to just hot targets.

Thermal imaging cameras are deployed in numerous commercial applications where it is impractical or too expensive to use active illumination (lights). They are perfect for a wide variety of applications including transportation, maritime, security, fire fighting, and medical applications. The cameras often provide improved daytime viewing in environments where traditional video camera performance suffers, such as in shadows or backlit scenes.

The FC-Series camera is a state-of-the-art thermal imaging system that will provide excellent night visibility and situational awareness, without any form of natural or artificial illumination. The system is easy to use, but it is useful to understand how to interpret what is displayed on the monitor.

While the imagery on the monitor may at first look similar to ordinary black and white daylight video, experience with the camera in varying conditions and seasons will lead to an appreciation of the characteristics that make thermal imaging distinct. A few tips on how to interpret some of the imagery may help you to make the most of your system.

The thermal camera does not sense light like conventional cameras; it senses heat or temperature differences. The camera senses small “differences” in apparent radiation from the objects in view, and displays them as either white (or lighter shades of gray) for warmer objects, and black (or darker shades of gray) for colder objects.

The thermal imaging camera relies on the fact that all objects, even very cold objects like ice, emit thermal energy in the portion of the infrared spectrum that this camera can “see”, the long wave infrared (LWIR). Therefore, unlike an illuminated infrared camera, a thermal camera does not need an additional active illumination source, and creates video based on directly radiated rather than reflected energy.

This is why hot objects such as parts on an engines and exhaust pipes appear white, while the sky, puddles of water and other cold objects appear dark (or cool)[4]. Scenes with familiar objects will be easy to interpret with some experience. The camera automatically optimizes the image to provide you with the best contrast in most conditions, and in some cases the Scene Presets mentioned above and other settings can be used to further improve the image.

With the Radiometry feature, the FC-Series R camera can provide temperature measurements and generate alarms based on temperatures that cross pre-defined levels. The ability to use a thermal camera to make reasonably accurate temperature measurements requires at least a minimum level of expertise in the science known as thermography. There are quite a few factors that will influence the accuracy and precision of a temperature measurement from the camera, and users are encouraged to seek training. The Infrared Training center offers training (including online training) and certification in all aspects of thermography: http://www.infraredtraining.com/.

4. By default, the camera represents hot objects as white and cold objects as black. The camera can be set to use the Black Hot polarity setting, which displays hot objects as black and cold objects as white and is effectively the negative of White Hot polarity. Refer to Toggle Polarity, pg. 2-4.

2.6 Troubleshooting Tips

If you need help during the installation process, contact your local FLIR representative or, call 888-747-3547 inside the US. FLIR Systems, Inc. offers a comprehensive selection of training courses to help you to get the best performance and value from your thermal imaging camera. Find out more at the FLIR training web page: http://www.flir.com/training.

Image freezes momentarily

By design, the camera image will freeze momentarily on a periodic basis during the Flat Field Correction (FFC) cycle (also known as Non-Uniformity Correction or NUC). Every few minutes, the image will momentarily freeze for a fraction of a second while the camera performs a flat field correction. A shutter activates inside the camera and provides a target of uniform temperature, allowing the camera to correct for ambient temperature changes and provide the best possible image. Just prior to the FFC, a small green square will appear in the corner of the screen.

Using FSM, it is possible to adjust the frequency of how often the FFC operation occurs. Using the Advanced Sensor Control, it is possible to change the FFC interval or to disable the automatic FFC entirely by setting it to Manual mode. For the best possible image, it is recommended the factory settings are used.

No video

If the camera will not produce an image, check the video connection at the camera and at your display. If the connectors appear to be properly connected but the camera still does not produce an image, ensure that power has been properly applied to the camera and the circuit breaker is set properly. If a fuse was used, be sure the fuse is not blown. If the video cabling is suspected as a possible source of the problem, plug a monitor into the RCA connection inside the camera and determine if it produces an image.

When the camera is powered on, it will do a NUC operation shortly after startup. If you are uncertain if the camera is receiving power, it may be useful to listen to the camera to hear if the click-click of the shutter mechanism can be heard. It may only be possible to perform this test when the camera is on a work bench rather than in its installed position.

If the camera still does not produce an image, contact the FLIR dealer or reseller who provided the camera, or contact FLIR directly (contact information is provided on the rear cover of this manual).

Performance varies with time of day

You may observe differences in the way the camera performs at different times of the day, due to the diurnal cycle of the sun. Recall that the camera produces an image based on temperature differences.

At certain times of the day, such as just before dawn, the objects in the image scene may all be roughly the same temperature, compared to other times of the day. Compare this to imagery right after sunset, when objects in the image may be radiating heat energy that has been absorbed during the day due to solar loading. Greater temperature differences in the scene generally will allow the camera to produce high-contrast imagery.

Performance may also be affected when objects in the scene are wet rather than dry, such as on a foggy day or in the early morning when everything may be coated with dew. Under these conditions, it may be difficult for the camera to show the temperature the object itself, rather than of the water coating.

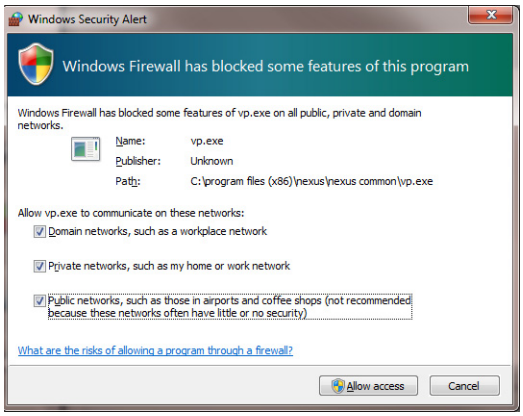
Unable To Communicate Over Ethernet

First check to ensure the physical connections are intact and that the camera is powered on and providing analog video to the monitor. When the camera is turned on, confirm the startup information is displayed on the analog monitor after approximately 2 min. For example:

```
S/N: 1234567
IP Addr: 192.168.250.116
```

Confirm that the IP address for the PC (for example, 192.168.250.1) is on the same network as the camera.

Next determine if Windows Personal Firewall is blocking the packets. You can turn off the firewall or add an exception for the FSM program. Typically when FSM runs for the first time, a pop-up notification may ask for permission to allow the FLIR Sensors Manager (fsm.exe) to communicate on the network. Select the check boxes (domain/private/public) that are appropriate for your network.


Windows Security Alert
Windows Firewall has blocked some features of this program
Windows Firewall has blocked some features of vp.exe on all public, private and domain networks.
Name: vp.exe
Publisher: Unknown
Path: C:\program files (x86)\nexus\nexus common\vp.exe
Allow vp.exe to communicate on these networks:
Domain networks, such as a workplace network
Private networks, such as my home or work network
Public networks, such as those in airports and coffee shops (not recommended because these networks often have little or no security)
What are the risks of allowing a program through a firewall?
Allow access
Cancel

By default the camera will broadcast a “discovery” packet two times per second. When FSM starts up, it listens to the network for the discovery packets. If no cameras are listed in the Discovered Servers list, press the Refresh button. If the list is still empty, it indicates no discovery packets were received. This could be due to a wide variety of limitations with the network, the PC, or the camera.

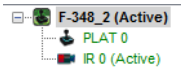
If necessary, use a packet sniffer utility such as Wireshark to capture packets and confirm the packets are being received by the PC from the camera.

Unable to control the camera

If the camera does not respond to commands (for example, the camera does not zoom when the zoom in button is clicked), you may not have control of the camera. The Web server allows two sessions to be connected to the camera at a time. By default, control of the camera will automatically be requested.

In FSM, if there are multiple cameras and/or multiple FSM clients, it may be necessary to manually make the camera active and take control of it.

In the Sensors Panel, if the camera is the active sensor, there will be an “(Active)” notification next to the name of the camera. Only one camera or sensor can be active at a time. To make the camera active, right click on the icon to the left of the camera name and select “Set Active”, or simply double-click on the icon.



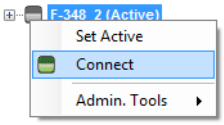
The icon to the left of the camera name indicates the status of the sensor. The following is a list of the possible icons and the meaning of each one.

Connected and Controlled

This icon indicates the camera has been discovered and added to the list of active servers, and the camera is actively “connected” to the FSM client and receiving status updates. The joystick in the icon indicates the user has control of the camera. To release control of the camera, right click on the icon and select “Release Control”.

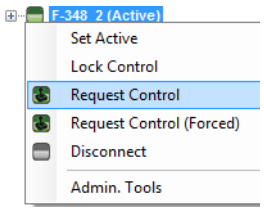
Discovered

This icon indicates the camera has been discovered and added to the list of active servers, but the camera is not actively “connected” to FSM, and therefore FSM is not receiving status updates. To connect to the camera, right click on the icon and select “Connect”. Alternatively, it is possible to double-click the icon to connect.



Connected

This icon indicates the camera has been discovered and added to the list of active servers, and the camera is actively “connected” to FSM and receiving status updates. To take control of the camera, right click on the icon and select “Request Control”. Alternatively, it is possible to double-click the icon to take control.

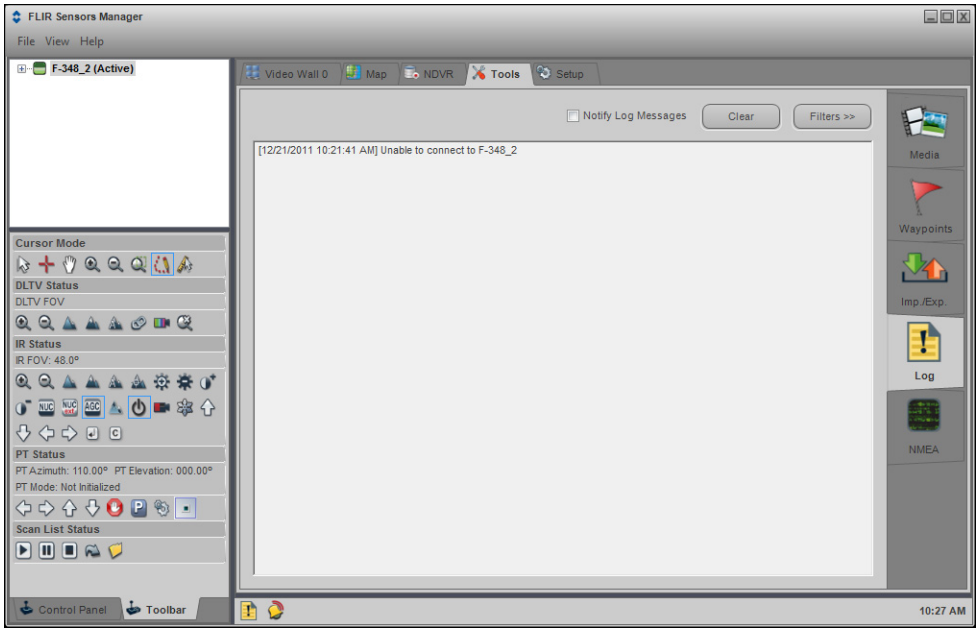


Not Connected

This icon indicates the camera has been discovered and added to the list of active servers, and FSM is trying to connect to the camera, but some kind of problem is preventing FSM from receiving status updates the camera. This could be do to a wide variety of problems in the camera, network or PC. Most often this situation occurs when a firewall allows certain packets (such as the discovery packets) but not others (the packets needed for a “connection”).

General Errors

In the status bar at the bottom of the FSM screen there may be an indication that an error has occurred. When you position the cursor over the error icon (exclamation mark), the error will be displayed in a temporary pop-up. It is possible to view all the error messages by selecting the Tools tab at the top of he screen, and then select the Log button to the left.



Unable to View Video Stream

If the video stream from the camera is not displayed in FSM, it could be that the packets are blocked by the firewall, or there could be a conflict with video codecs that are installed for other video programs.

When displaying video with FSM for the first time, the Windows Personal Firewall may ask for permission to allow the FLIR Video Player (vp.exe) to communicate on the network. Select the check boxes (domain/private/public) that are appropriate for your network.

If necessary, test to make sure the video from the camera can be viewed by a generic video player such as VLC media player (http://www.videolan.org/vlc/).To view the video stream, specify RTSP port 554 and the appropriate stream name such as “ch0”. For example:

rtsp://192.168.250.116:554/ch0

Refer to Video, pg. 3-14 for additional information on RTP and stream names.

Noisy image

With the analog video signal, a noisy image is usually attributed to a cable problem (too long or inferior quality) or the cable is picking up electromagnetic interference (EMI) from another device. Although coax cable has built-in losses, the longer the cable is (or the smaller the wire gauge/ thickness), the more severe the losses become; and the higher the signal frequency, the more

pronounced the losses. Unfortunately this is one of the most common and unnecessary problems that plagues video systems in general.

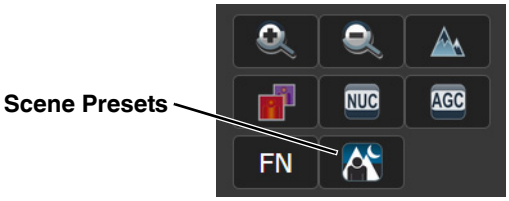
Cable characteristics are determined by a number of factors (core material, dielectric material and shield construction, among others) and must be carefully matched to the specific application. Moreover, the transmission characteristics of the cable will be influenced by the physical environment through which the cable is run and the method of installation. Use only high quality cable and ensure the cable is suitable to the marine environment.

Check cable connector terminations. Inferior quality connections may use multiple adapters which can cause unacceptable noise. Use a high-quality video distribution amplifier when splitting the signal to multiple monitors.

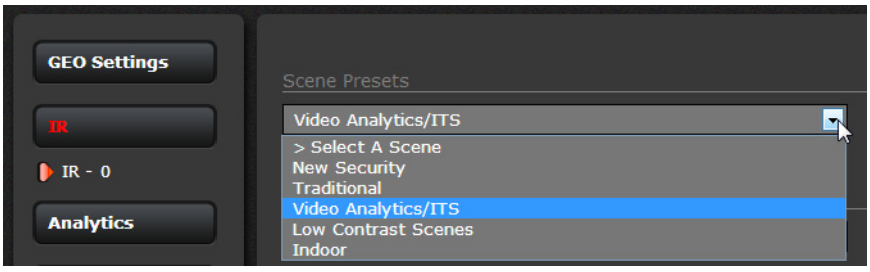
Image too dark or too light

By default the FC-Series camera uses an Automatic Gain Control (AGC) setting that has proven to be superior for most applications, and the camera will respond to varying conditions automatically. The installer should keep in mind that the sky is quite cold and can strongly affect the overall image. It may be possible to avoid a problem by slightly moving the camera up or down to include (or exclude) items with hot or cold temperatures that influence the overall image. For example, a very cold background (such as the sky) could cause the camera to use a wider temperature range than appropriate.

There are five Scene Presets that use a combination of settings to produce different configurations that could improve the video image for a given set of conditions. The presets can be toggled with the Scene Presets button on the **Live Video** page.



The presets can also be selected from the Scene Presets in the **Setup** page. Refer to Thermal Image Setup, pg. 3-2



Available Scene Presets

Eastern or Western Exposure

Once installed, the camera may point directly east or west, and this may cause the sun to be in the field of view during certain portions of the day. We do not recommend intentionally viewing the sun, but looking at the sun will not permanently damage the sensor. In fact the thermal imaging camera often provides a considerable advantage over a conventional camera in this type of back-lit situation.

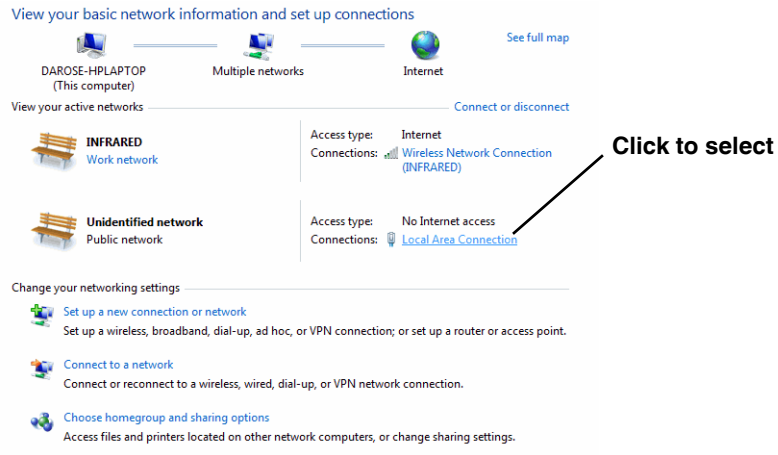
However, the sun may introduce image artifacts that will eventually correct out. and it may take some time for the camera to recover. The amount of time needed for recovery will depend on how long the camera was exposed to the sun. The longer the exposure, the longer the recovery time needed.

Figure 2-4: Images facing sun from standard camera (left) and thermal camera (right)

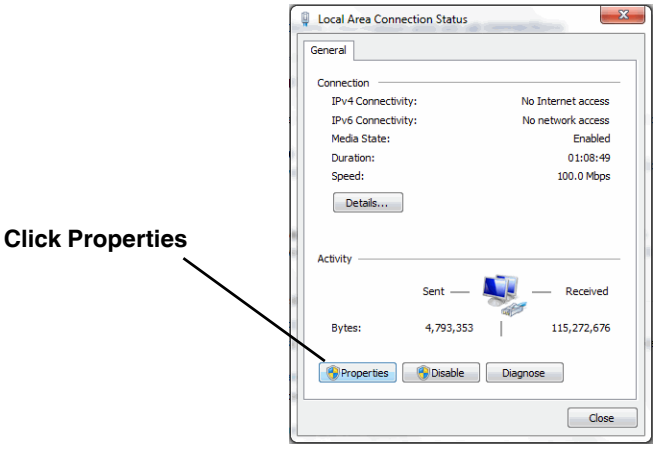
2.7 Setting the IP address on a Windows PC

To set the computer IP address in Windows, first connect the PC to a switch, or connect it to the camera and ensure the camera has power.

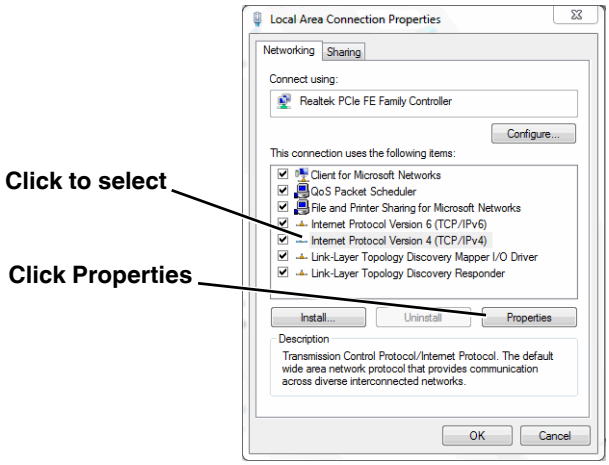
Step 1 With the PC or laptop connected to the switch (or if back-to-back with the camera, with the camera powered on), open the Control Panel, Network and Sharing Center (a Windows 7 example is shown). The connection to the camera should show in your Active Networks.


View your basic network information and set up connections
See full map
DAROSE-HPLAPTOP
(This computer)
Multiple networks
Internet
View your active networks
Connect or disconnect
INFRARED
Work network
Access type: Internet
Connections: Wireless Network Connection (INFRARED)
Unidentified network
Public network
Access type: No Internet access
Connections: Local Area Connection
Click to select
Change your networking settings
Set up a new connection or network
Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a router or access point.
Connect to a network
Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.
Choose homegroup and sharing options
Access files and printers located on other network computers, or change sharing settings.

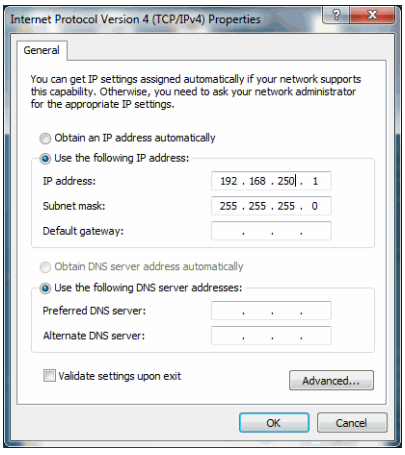
Step 2 Click to select the Local Area Connection then click Properties, as shown at the right.



Step 3 Select Internet Protocol Version 4 (TCP/IPv4) as shown. Then click Properties.



Step 4 Select **Use the following IP address**, then enter 192.168.250.xxx, where xxx is any number between 1-255, other than 116 (the camera default).


Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 250 . 1
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

Step 5 Set the Subnet mask to 255.255.255.0, then click OK.

3 Advanced Configuration

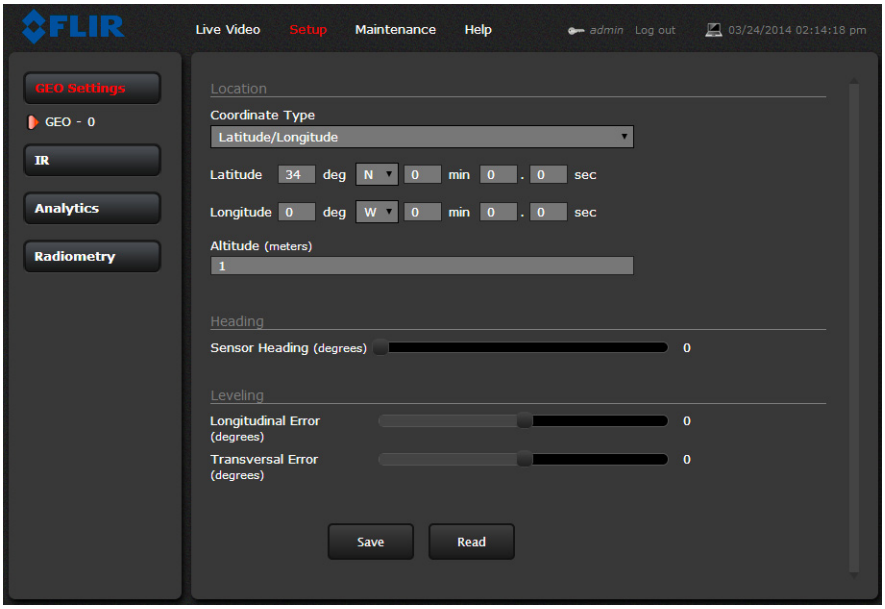
In this chapter, additional setup and configuration settings related to the following topics are described:

- Optimizing the thermal image
- Setting up detection areas for Video Analytics (VA)
- Setting up measurement spots and areas for temperature monitoring
- Configuring alarm responses and email notifications
- Configuring the camera to work with a third-party VMS (ONVIF)
- Enabling On Screen Display (OSD) text
- Setting up the video streams to optimize quality and network performance

When configuration changes are made with the web browser, the settings are saved to a configuration file. It is a good idea to make a backup of the existing configuration file prior to making changes, and another backup once the changes are finalized. If necessary the camera can be restored to its original factory configuration or one of the saved configurations (refer to Files Menu, pg. 3-23).

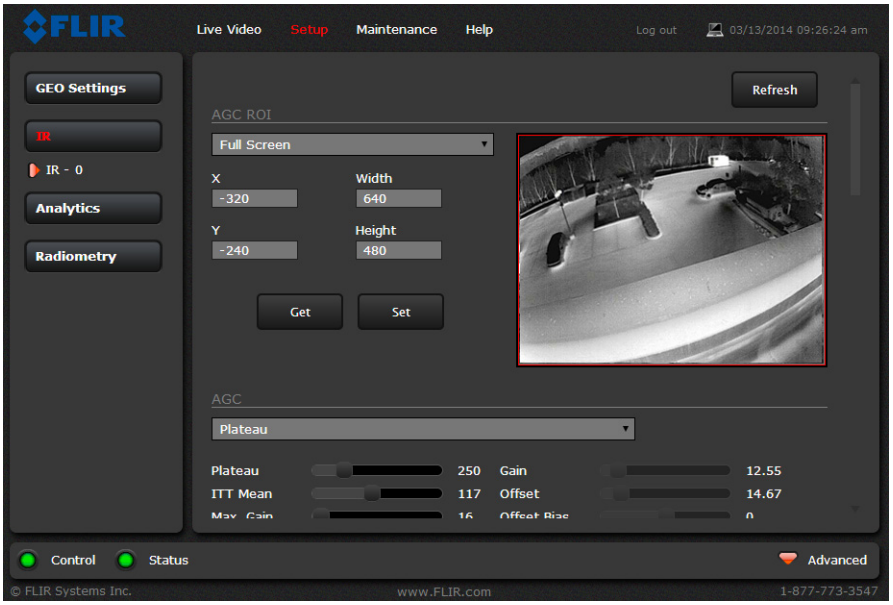
3.1 Setup Menu

The **Setup** menu has configuration options for setting the GEO parameters (geo-reference map location used by programs like FSM), making changes to the IR (thermal) camera, defining Video Analytics motion detection zones, and setting Radiometry temperature measurement areas (FC-Series R only). The changes made through the **Setup** menu have an immediate effect (it is not necessary to stop and restart the server). Note, it is necessary to save the changes if it is desirable to use the new settings at power up (refer to Save Settings, pg. 3-3).



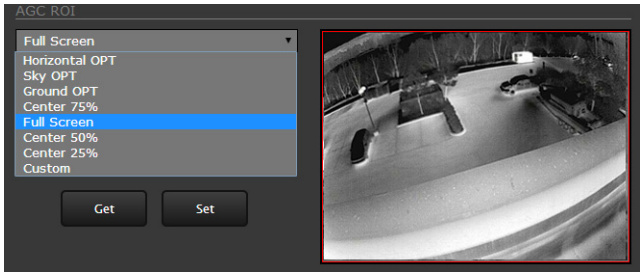
3.1.1 Thermal Image Setup

In most installations it will not be necessary to change the thermal camera from the default settings. However in some situations, depending on weather, time of day and so on, it may be useful to make changes to the video image to enhance the image by modifying one or more of the parameters.



IR page

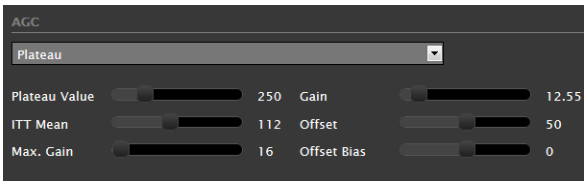
In the **IR** page, a single JPEG image (a snapshot) is displayed in the upper right-hand corner. To update this image at any time, it is necessary to select the Refresh button. This will cause the entire page to refresh, including the image and all the parameter values (be patient, this may take some time).



AGC ROI: The camera adjustments under the ROI heading allow the user to make changes to the Region Of Interest. The ROI determines what portion of the image is considered by the Automatic Gain Control (AGC) algorithm. By default all of the pixels in the image are considered; in some cases it may provide an improved image if a portion of the image is excluded. For example, the sky is generally very cold, so if the ROI excludes the sky it may add more contrast to the rest of the image. A pull-down list offers some convenient options. Select Custom to enter specific numbers into the X, Y, Width, and Height boxes.

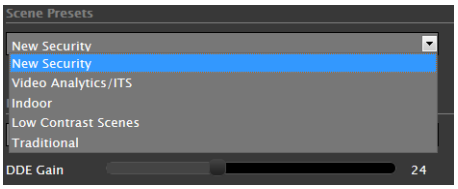
AGC: The AGC parameters affect how the overall video image appears. The default Plateau algorithm is suitable for most installations, but in some cases one of the other selections may provide a more appealing image, depending on personal preferences. Be aware the settings that are optimal at one time may be less optimal a short time later, since conditions such as weather and time of day affect the image and are constantly changing.

Experiment with different AGC modes to find the settings that work best for the particular installation (it may be best to start with the Scene Presets options, see below). It is always possible to return to the default settings by selecting the Factory Defaults button at the bottom of the page.



With the Plateau mode, the ITT Mean parameter effects overall brightness, and Max Gain can generally be used to increase contrast (although it may also increase noise due to gain).

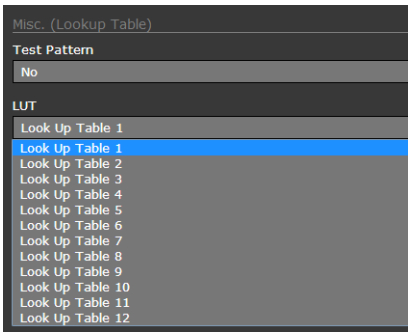
Scene Presets: Each Scene Preset provides a combination of AGC and Digital Detail Enhancement (DDE, see below) parameters that are preferred for certain types of conditions. Select a preset that provides an image that is optimal for the installation.



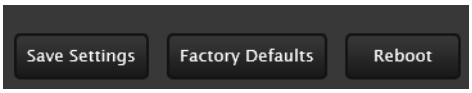
Digital Detail Enhancement (DDE): DDE is an image processing technique that enhances details by emphasizing lines and edges.

Flat Field Correction (FFC): A Flat Field Correction operation can be used to correct for non-uniform responsivity within the pixel array. A shutter activates inside the camera and provides a target of uniform temperature, allowing the camera to correct for ambient temperature changes and provide the best possible image. The camera performs FFC at regular intervals or when the ambient temperature changes, but can also be performed as desired and may cause an overall image improvement. Refer to Image freezes momentarily, pg. 2-14.

Misc. (Lookup Table): Select any of the 12 color palettes. Look Up Table 1 is white hot, Look Up Table 2 is black hot; the other tables assign different colors to different temperatures. These color palettes can also be selected from the Web Controls on the Live Video page (refer to Toggle Palette, pg. 2-4).



Save Settings



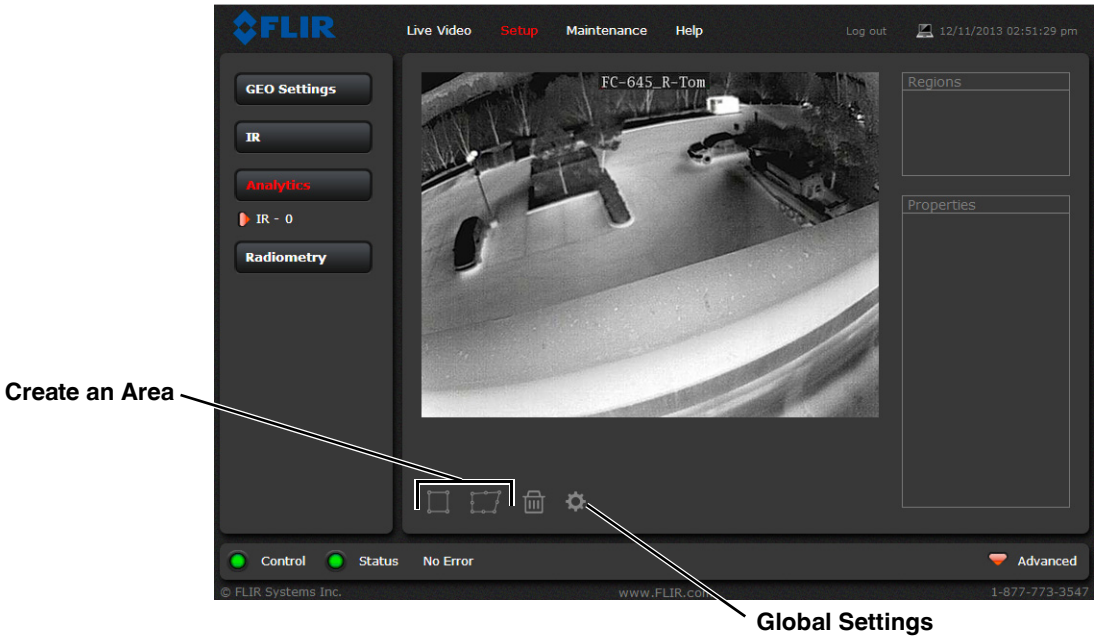
When the Save Settings button at the bottom of the page is selected, the camera will use the saved settings whenever the power is cycled. To restore the IR camera to the original settings, select the Factory Defaults button and then click on Save Settings.

3.1.2 Video Analytics Setup

The Analytics function of the FC-Series camera provides the capability to detect motion and characterize detected objects based on size and aspect ratio (height and width). Using the **Setup** menu Analytics page, up to four motion detection areas can be created with independent detection settings. When enabled, these detection areas provide alarm signals to the camera software. Use the **Maintenance** menu (requires the admin login), to define the actions resulting from each alarm condition (Alarm Manager, pg. 3-20).

Analytics page

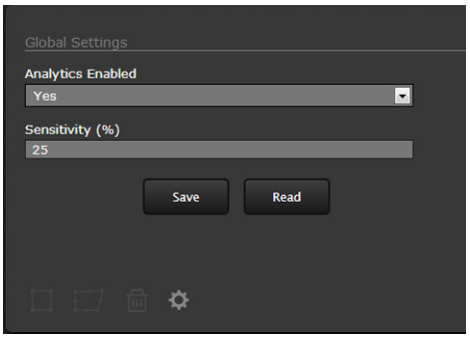
To use Video Analytics it is necessary to setup areas of interest for detection. In some situations it may also be useful to use multiple areas of interest (up to four) to include and exclude specific areas from motion detection. The Analytics page allows areas (polygons) with four or eight corners. Each area is assigned an Alarm Id (0 to 3) based on the order in which it is created and the available IDs. If an area is deleted, its Alarm Id will be available for reuse.



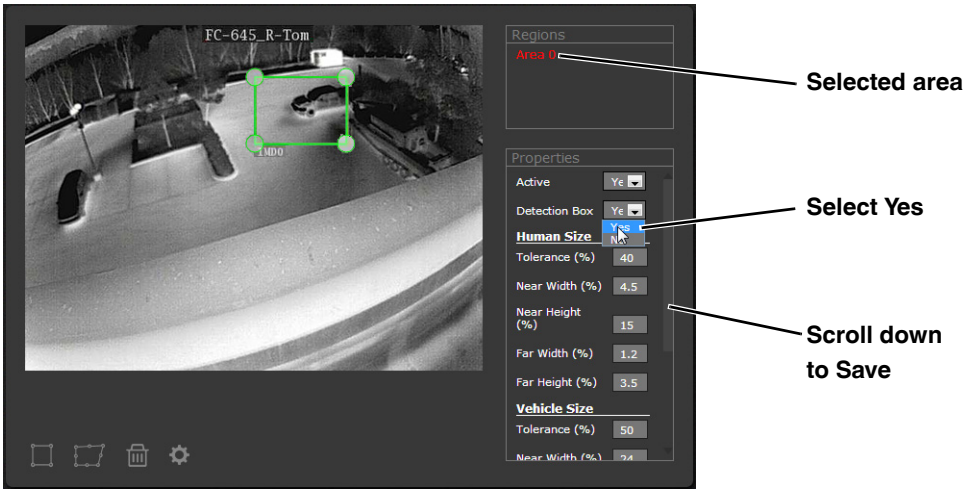
Select the gear icon to access Global Setting to enable analytics and set the detection sensitivity.

There are five settings for sensitivity: 0 - low, 25 - mid low, 50 - mid, 75 - mid high, and 100 - high. Sensitivity is set to whichever of these five options is closest. For example, 30 would go to 25 - mid low. With lower sensitivity, smaller (distant) objects are not detected.

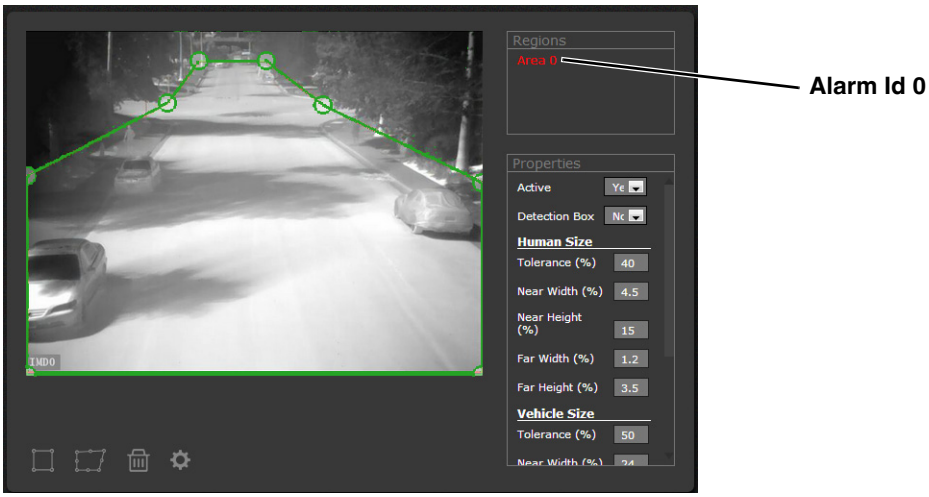
Set Analytics Enabled to Yes, click Save, and then click the gear icon to return to the Analytics Setup page.



Creating Motion Detection Areas: To create a detection area, select one of the polygon icons and then drag any of the highlighted corners in the video image to define the detection area. In the Properties box ensure that Active is set to Yes, set Detection Box to Yes, and scroll down and click Save.



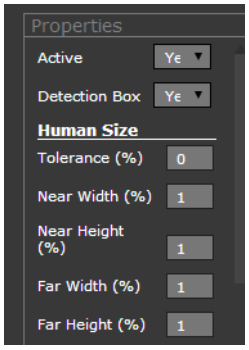
Four Corner Detection Area

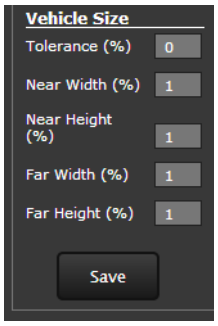


Eight Corner Detection Area

Setting Detection Properties: The video analytics provide recognition of two types of objects based on size and aspect ratio: Human Size and Vehicle Size.

With Active and Detection Box set to Yes, a detected object is shown as a yellow, orange, or red box surrounded by both the minimum and maximum bounding boxes for humans and vehicles that are setup in the Properties for each area. Refer to Table 3-1 for a definition of the colors.





To simplify defining the Properties, begin by setting the parameters for Human Size and for Vehicle Size as follows: Tolerance = 0, Near Width = 1, Near Height = 1, Far Width = 1, and Far Height = 1. Then scroll down and click Save. This will have the effect of minimizing the number and size of detection boxes displayed on the screen so that a single parameter at a time can be addressed.

Note

The settings above are arbitrary and other initial settings may be better in some scenes. Typically, the Near Width and Near Height settings will be larger than Far Width and Far Height settings.

To set the Human Size properties, have a person walk around at the bottom of the area and adjust the Human Size Near Width and Near Height parameters so the blue box (near human) is the same size as the yellow detection box. Click Save.

Near Human Detection Boxes

Then, have the person walk around at the top of the area and adjust the Human Size Far Width and Far Height parameters so the purple box (far human) is the same size as the yellow detection box around them. Click Save.

The yellow detection box will change to orange when it fits between the minimum (far human) and maximum (near human) bounding boxes.

Set the Human Size Tolerance to allow for expected variations in the detected person size. A tolerance of 10% will cause the Near bounding box to increase by 10% and the Far bounding box to decrease by 10%. The tolerance is set independently for Human Size and Vehicle Size.

Far Human Detection Boxes

Repeat this same exercise using an appropriate vehicle to determine the Vehicle Size parameters.

Finally, set the Vehicle Size Tolerance to allow for expected variations in the detected vehicle size. A tolerance of 10% will cause the Near bounding box to increase by 10% and the Far bounding box to decrease by 10%. The tolerance is set independently for Human Size and Vehicle Size.

The detection box of a “moving” object will initially be yellow. If the detection box fits between the Human Size bounding limits (near and far), it will turn orange and generate a human alarm. If the detection box fits between the Vehicle Size bounding limits (near and far), it will turn red and generate a vehicle alarm. Refer to Alarm Manager, pg. 3-20 for a description of available actions as a result of these alarms.

Table 3-1: OSD Bounding Box Colors (Detection Box = Yes)

Bounding Box	Detection Box
	Detection Box - Yellow
Near Vehicle - Pink	Detected Vehicle - Red
Far Vehicle - Green	
Near Human - Blue	Detected Person - Orange
Far Human - Purple	

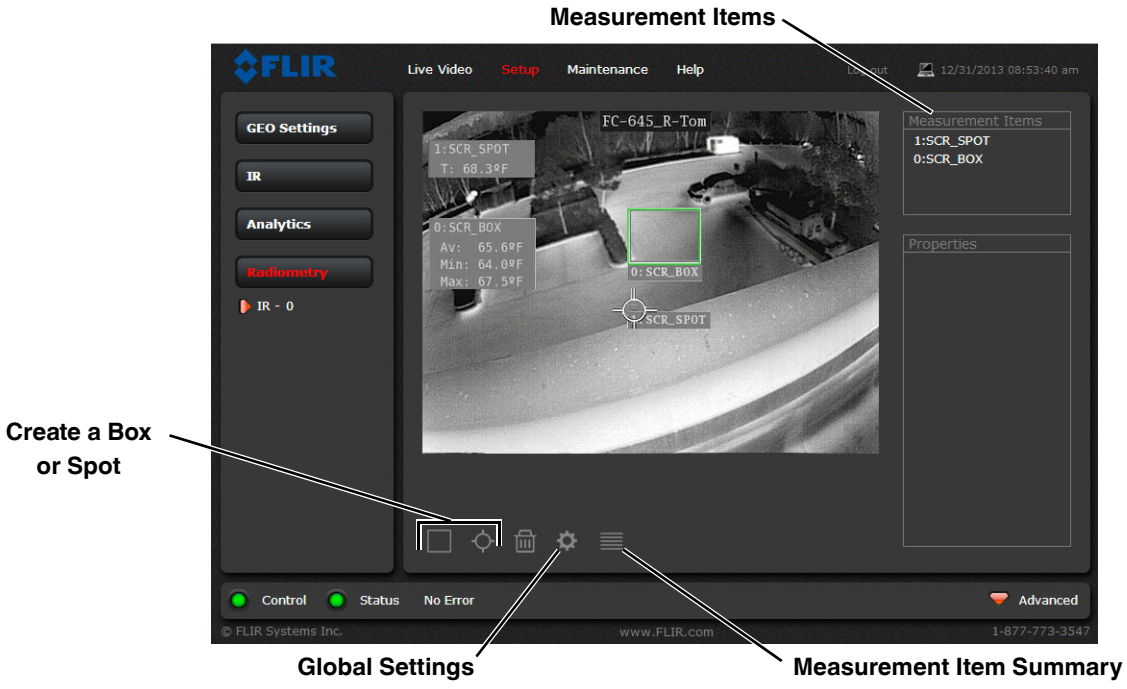
3.1.3 Temperature Monitoring Setup (FC-Series R camera only)

The Radiometry functions of the FC-Series R camera provides capabilities to measure and monitor temperatures. The ability to use a thermal camera to make reasonably accurate and precise temperature measurements requires at least a minimum level of expertise in the science known as thermography. There are quite a few factors influencing the accuracy and precision of a temperature measurement from the camera, and users are encouraged to seek training. The Infrared Training center offers training (including online training) and certification in all aspects of thermography: http://www.infraredtraining.com/.

Be aware that some of these factors can be corrected or adjusted within the camera to account for variations in conditions and distance. The camera has global settings which can be applied to all measurements, or each measurement can have its own set of correction factors.

Radiometry Page

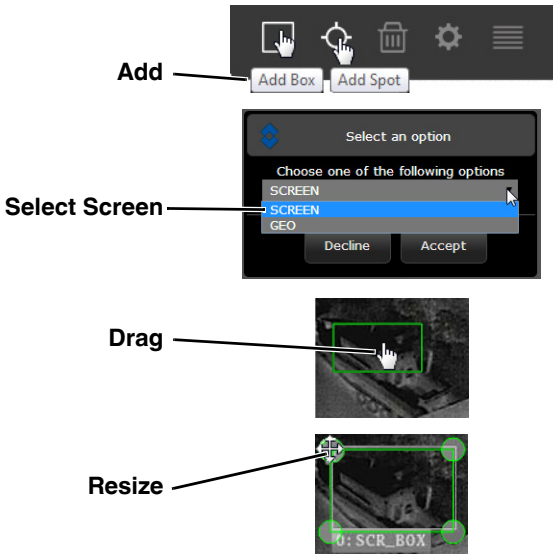
Using the **Setup** menu Radiometry page, you can designate up to four areas (spot or box) for temperature measurements. When enabled, these areas provide alarm signals to the camera software. You can define the actions resulting from each alarm condition using the **Maintenance** menu (requires the **admin** login). Refer to the Alarm Manager, pg. 3-20.



Shown above are the two default Measurement Items which appear on both the Live Video and Radiometry Setup pages when an FC-Series R camera is first powered up. Both are set to alarm (turn red) when a temperature above 90 °F is detected. In this example, the alarm can be easily tested by placing a bare hand in front of the camera to trigger the alarm. As a more rigorous test with an installed camera, have a person walk through the area where the box is, and adjust the properties like range, emissivity, etc until an alarm occurs.

Creating Measurement Items: To create a measurement box or spot, it is first necessary to have control of the camera (refer to Camera Control and Status, pg. 2-4).

To add a Measurement Item, select the appropriate icon below the image, and select **SCREEN** from the pull-down option list (the GEO option is used only with pan/tilt cameras), then click **Accept**. The box or spot will be added in the center of the image.



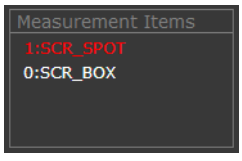
Click and drag the box or spot within the image to move it to the desired location. To change the size or shape of a box, click on the box in the image to select it (or click on the name in the Measurement Items list in the upper right of the page), and then click and drag one of the vertices (circles in the corners of the box). The specific settings of the measurement spot or box, including Alarm conditions, are configured in the Properties box to the right of the page and described below, refer to Measurement Item Properties.

The measurement data will appear on the left side of the video. If you do not wish to see the text data on the screen, refer to On Screen Display (OSD), pg. 3-18. If an alarm condition has been set, the alarm will continue to function even if the OSD temperature data is not displayed on the screen.

Added Temperature Spot

Four Corner Temperature Box

Select the Measurement Item to view or edit it's Properties. The name of an Item may be changed to indicate specific information about its location or purpose. The new name will appear in the OSD information, but only the Alarm Id will be used by the Alarm Manager when configuring an alarm response rule. Refer to the Alarm Manager, pg. 3-20.



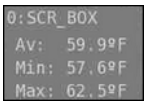
The following sections describe the setup parameters which can be edited. Scroll down and click Save after changing any Measurement Item parameters.

Measurement Item Properties: The Properties for each Measurement Item are grouped into three sections. The first section enables the individual item (Yes or No) and allows you to edit the default name. The Alarm Settings and the Local Parameters sections provide settings for each individual Measurement Item.

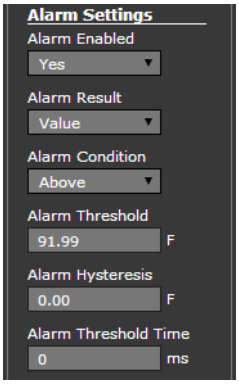
The Thermography OSD will only appear when the item is Enabled (the default), although the item (box or spot) will be still be shown in the Radiometry Setup page, refer to On Screen Display (OSD), pg. 3-18.

Spot OSD

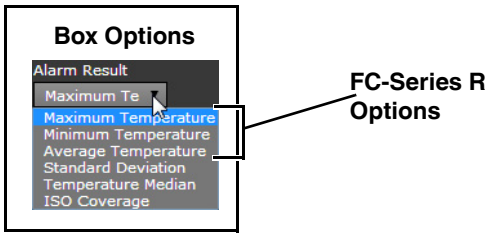
Box OSD



Alarm Settings: Set **Alarm Enabled** to Yes to generate an alarm.



The **Alarm Result** for a Spot Measurement Item depends only on the Value of the temperature reading. The Box Measurement Item has other options as shown in the illustration below.



The **Alarm Condition** defines the **Alarm Result** as being Below, Match, or Above the **Alarm Threshold**.

The **Alarm Threshold** is the temperature set point that will trigger the alarm when the **Alarm Condition** is met. The value is in degrees Celsius or Fahrenheit depending on the camera setting, refer to IR, pg. 3-13.

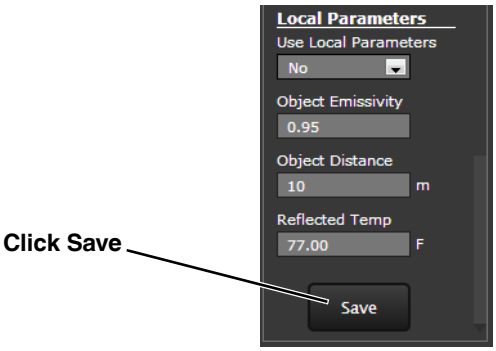
The **Alarm Hysteresis** determines how far below (or above if the **Alarm Condition** is set to Below) the **Alarm Threshold** that the temperature must go before the Alarm is turned off. The value is in degrees Celsius or Fahrenheit.

The **Alarm Threshold Time** determines the minimum time the Alarm will persist after being triggered. The maximum value is 30000 ms (30 sec) measured from the time the alarm is first triggered.

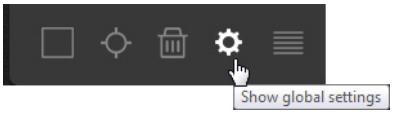
Local Parameters: Set the Object Emissivity, Object Distance, and Reflected Temp for the individual Measurement Item (Spot or Box). Then, set Use Local Parameters to Yes.

When Use Local Parameters is set to No, the Global Settings will be used.

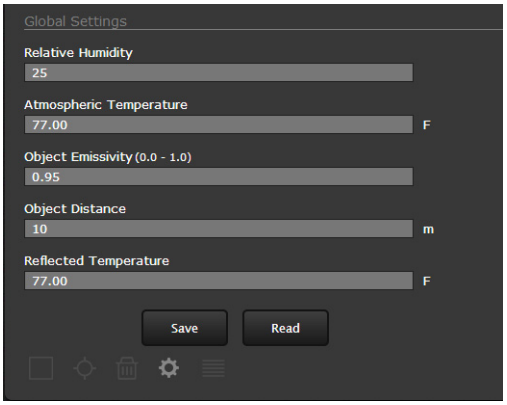
Scroll down and click Save after changing any Measurement Item parameters.



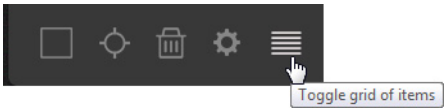
Global Settings: If a measurement spot or box has Use Local Parameters set to No, the Global Settings are used in the calculation of the indicated temperature. Select the gear icon to read and set Global Settings.

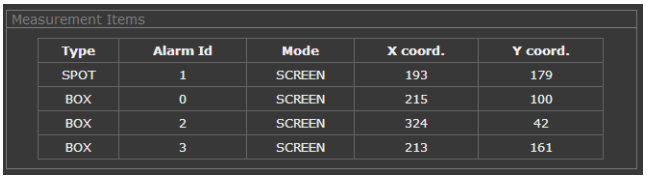


Click Save, and then click the gear to return to the Radiometry Setup page.



Measurement Items Summary: Select the table icon to see a summary of all the defined Radiometery Measurement Items.





Type	Alarm Id	Mode	X coord.	Y coord.
SPOT	1	SCREEN	193	179
BOX	0	SCREEN	215	100
BOX	2	SCREEN	324	42
BOX	3	SCREEN	213	161

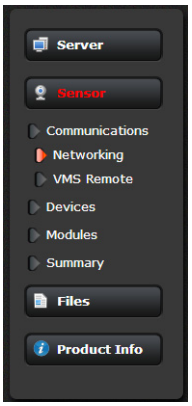
The Alarm Id is referenced by the Alarm Manager when configuring an alarm response rule, refer to Alarm Manager, pg. 3-20.

3.2 Maintenance Menu

The following sections describe more advanced camera configuration options that require the **admin** login. For the configuration changes in the remainder of this chapter, it is necessary to save the changes, then stop and restart the server to make the changes effective. Additional configuration options are available that are not described in this manual. For more information on setting or changing these camera parameters refer to the *Nexus IP Camera Configuration Guide* (FLIR Doc #427-0030-00-28) or contact the local FLIR representative or FLIR Technical Support.

The basic camera configuration settings (**LAN Settings**, **Services**, and **Security Options)** available through the **expert** login are described in Server Menu, pg. 2-6. When logged in as **admin**, additional Maintenance menus are accessible, including **Sensor**, **Files** and **Product Info**.

3.2.1 Sensor Menu



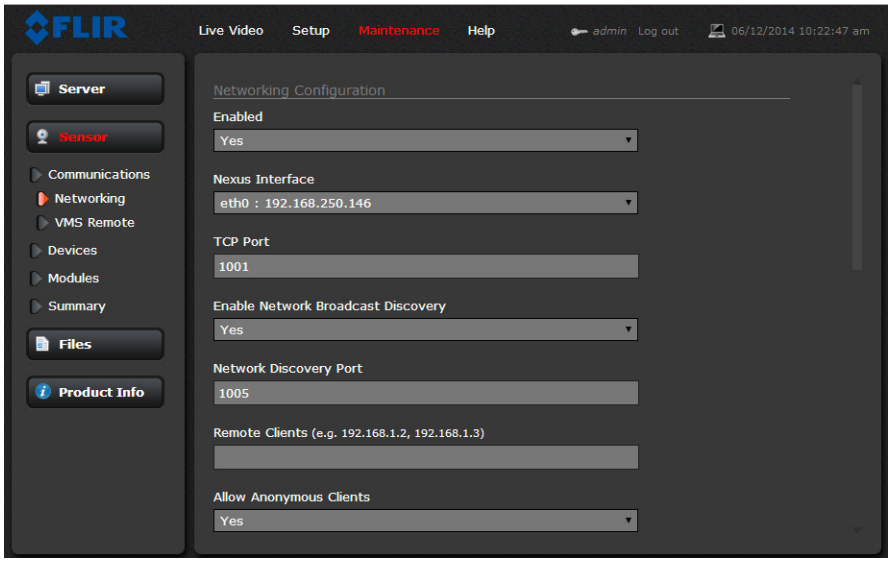
Most of the configuration changes described here are done through the Sensor menu, including configuration steps from the **Communications**, **Devices**, and **Modules** selections, as described below.

Communications Menu

The primary IP configuration parameters, such as IP address, network mask, and gateway, are configured with the LAN Settings page (LAN Settings, pg. 2-7.) Use the Networking page to configure some of the other IP networking parameters.

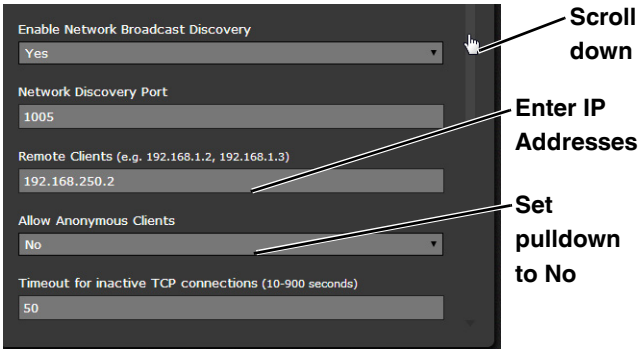
The ONVIF (Open Network Video Interface Forum) is an open industry forum for the development of a global standard for the interface of network video products. An ONVIF-compliant VMS can be used to control a FLIR camera, display video, and, for pan/tilt cameras, access up to 50 pan/tilt presets.

Networking Page: Generally it is assumed the camera network will be secured through recognized network security measures and best practices, such as limited physical access, firewalls, and so on. As an additional security consideration, it is possible to restrict access to the camera to a limited number of IP Addresses.



The default TCP port for most FLIR IP cameras is 1001. This is the port number that a client program such as FSM can use to communicate with the camera. If using an ONVIF-compliant VMS as a client, refer to VMS Remote, below.

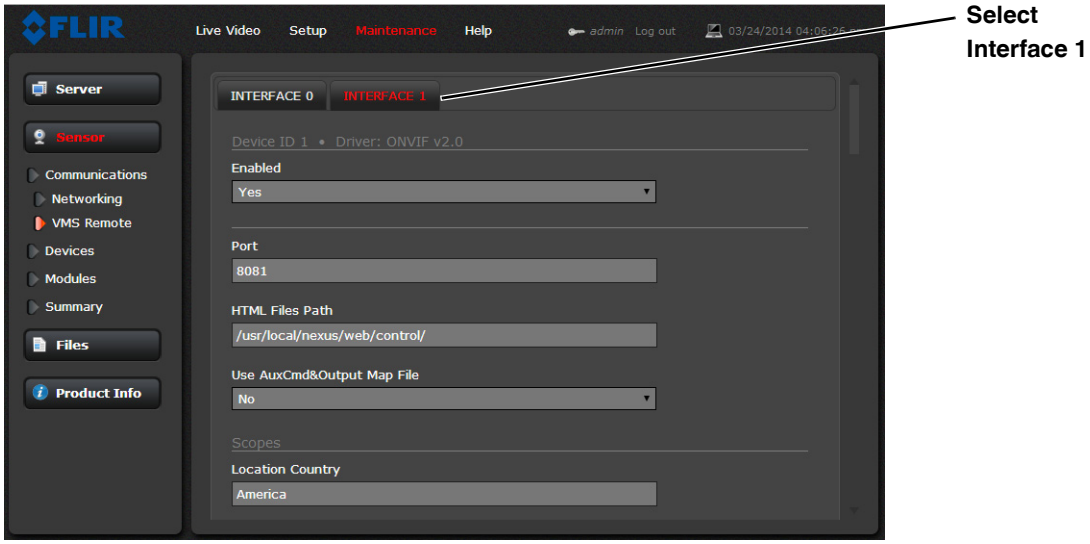
If the Enable Network Broadcast Discovery parameter is set to Yes, the camera sends out a “discovery” packet on the network every half second as an Ethernet broadcast. To restrict client programs to allowed IP addresses, enter allowed IP addresses in the Remote Clients list, then set the Allow anonymous clients parameter to No, and click Save. The changes will not take effect until the server is stopped and started.



After the interface is configured, scroll down and click on the Save button to save the configuration. The changes will not take effect until the server is stopped and started.

It is also possible to restrict access to the camera from a web browser. Refer to Security Options, pg. 2-11 to add an allowed IP address to the list in the Restrict Web Configuration section.

VMS Remote: If the camera is to be used with a third-party VMS that is compliant with ONVIF, the parameters can be adjusted (if needed) to work with the VMS. Refer to the VMS documentation to determine what parameter values are needed. By default, the camera is configured with a VMS Remote interface with ONVIF 2.0 parameters.

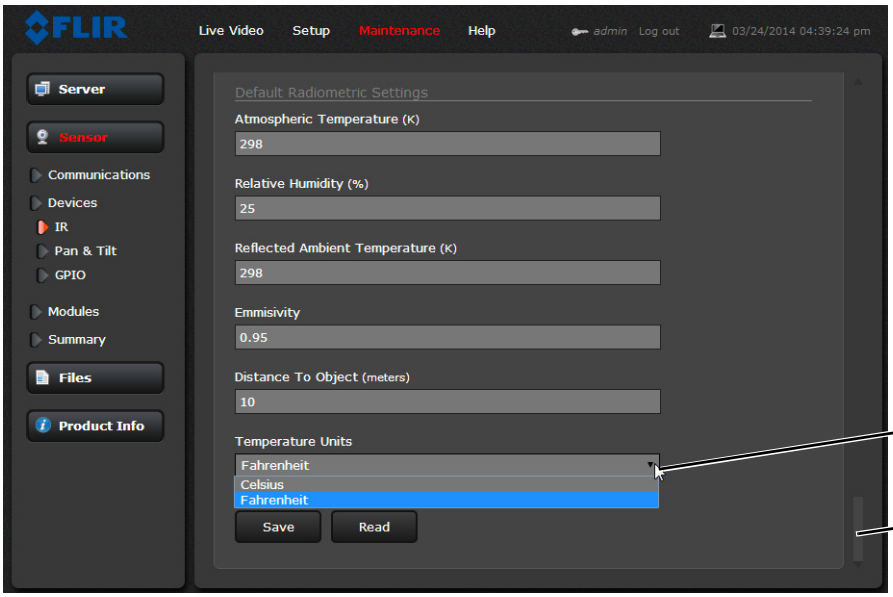


Several types of third-party Video Management System (VMS) systems are supported by FLIR IP cameras. Because these systems tend to evolve and change over time, contact the local FLIR representative or FLIR Technical Support to resolve any difficulties or questions about using this feature.

Devices Menu

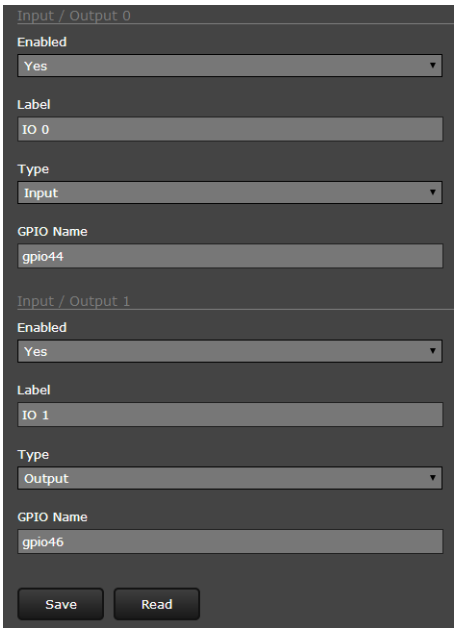
Set the temperature units for FC-Series R camera displays on the IR page. On the GPIO page read the default I/O parameters, set the output reset interval, or change signal labels. GPIO is enabled by default.

IR: Adjustments to the IR settings should only be made by someone who has expertise with thermal cameras and a thorough understanding of how the various settings affect the image. Haphazard changes can lead to image problems including a complete loss of video. Setting the temperature display to Fahrenheit or Celsius is included on this page. Click on the Save button to save the settings. The changes will not take effect until the server is stopped and started.



GPIO: GPIO is enabled by default, although the GPIO signals must be wired during installation, refer to General Purpose Input/Output (GPIO), pg. 1-2. The **Output Reset Interval** can be used to automatically reset the output signal after a certain amount of time. The value of 0 prevents the GPIO from resetting automatically (it must be reset with a client program such as FSM).

The illustration at the right shows the default settings for both the input and the output signals.



In order to make these signals more meaningful in a camera network or VMS software, set the **Label** to reflect the purpose of the signal, such as **IO 0 Input** for the input signal and **IO 1 Output** for the output signal.

Click on the Save button to save any changed settings. The changes will not take effect until the server is stopped and started.

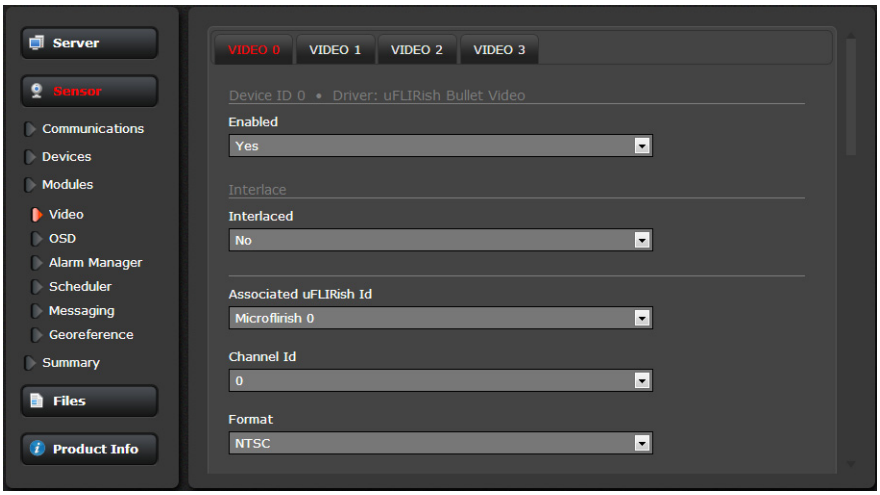
Modules Menu

This section describes the Video page, On Screen Display (OSD) page, and Alarm Manager page. On the OSD page, set the text (camera name, date/time, etc.) to overlay on the video. The OSD text will appear on the IP video streams as well as the analog video output. Use the Alarm Manager page to define rules for internal camera alarms from Video Analytics, Radiometric IR, or GPIO.

Video: Use this page to modify the video stream parameters by selecting the various parameters that affect both image quality and transmission bandwidth.

By default, four video streams are enabled for the camera: Video 0, Video 1, Video 2, and Video 3. The Video 0 and Video 1 streams are available for viewing from a client program such as FSM, a stand-alone video player, or a third-party VMS. Video 2 is used for snapshots (and image capture when it is an alarm, and Video 3 is used by the web browser Live Video display.

Video 0 uses H.264 encoding and Video 1 uses MPEG 4 encoding. To modify parameters that affect a particular IP Video stream from the camera, select the appropriate link at the top of the page (for example, **Video 0**).



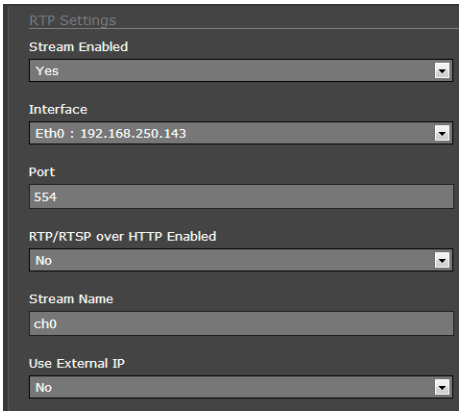
With the factory configuration, the default parameters provide high-quality full frame-rate video streams with reasonable bandwidth usage. The default settings for each video stream provide high-quality, full frame-rate video. In general, for most installations it will not be necessary to modify the default parameters. However in some cases, such as when a video stream is sent over a wireless network, it may be useful to “tune” the video stream to try to reduce the bandwidth requirements. In particular, the RTP Settings, Network Options, and the Settings parameters are described below.

It is possible to adversely affect the performance and/or image quality if changes are done incorrectly or haphazardly by an untrained person.

There are some challenges with streaming video over an IP network, when compared to other traditional IP applications which are less time-critical, such as email and web browsing. In particular, there are requirements which must be fulfilled to ensure satisfactory video quality in professional security environments. There are many parameters and factors related to network infrastructure, protocols, codecs and so on that can affect the quality and bit rate of a video stream when it is established between the camera and a client.

The video streaming is done using a protocol generally referred to as Real-time Transport Protocol (RTP), but there are actually many protocols involved, including Real-Time Transport Control Protocol (RTCP) and Real Time Streaming Protocol (RTSP). In the background, a “negotiation” takes place to establish a session between the client (such as FSM, or a third party VMS or video player) and the camera. The ports which form a session are negotiated using a protocol such as RTSP. A client typically requests a video stream using its preferred settings, and the camera can respond with its preferred settings. As a result, many of the details are established dynamically, which may run contrary to network security requirements.

In some networks, the RTP/RTSP traffic is carried (tunneled) over Hypertext Transfer Protocol (HTTP) as that may allow the traffic to cross network boundaries and firewalls. While this method involves more overhead due to encapsulation, it may be necessary for clients to access the video streams when HTTP proxies are used.

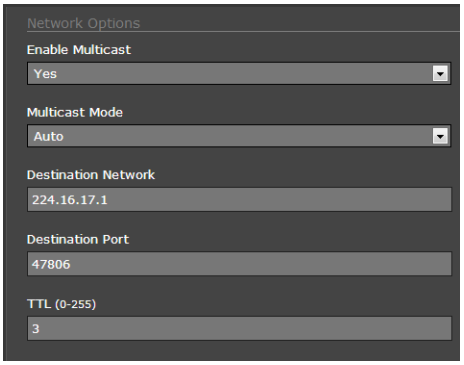


According to the specification, RTP is originated and received on even port numbers and the associated RTCP communication uses the next higher odd port number; the default RTP Port is 554. The Stream Name is used when establishing a session from a client. The default value recognized by FSM for the first stream is ch0; the complete connection string is: rtsp://192.168.250.116/ch0.

If necessary, this stream name can be used to open a video stream with a third-party video player.

By default the video stream uses the IP address of the camera. If the Use External IP parameter is set to “yes”, an alternate IP address can be entered.

Note, always use an even port number for the RTP Port parameter.



By default, the video streams from the camera are sent using unicast packets rather than multicast. This means a given packet of IP Video will be sent separately to each client that has that video stream open (for example, FSM clients, nDVR, and so on). Therefore each additional client will cause the bandwidth consumption to go up and cause more overhead on the system in comparison to multicast.

On the other hand, video packets sent using multicast are shared by streaming clients, so additional clients do not cause bandwidth consumption to go up as dramatically. If the video streams are used by more than one client/location, it may be wise to use multicast for more efficient bandwidth usage.

To set the camera to use Multicast, set the Enable Multicast parameter to “yes”, and set the Destination Network address and Destination Port to a unique combination that will not conflict with other IP Video devices on the network (the Destination Port must be an even number).

If more than one camera is providing multicast streams on the network, be sure to configure each stream with a unique multicast Destination Network IP address and Destination Port combination.

The parameters in the Settings section will have a significant impact on the quality and bandwidth requirements of the video stream. In general it is recommended that the default values are used initially, and then individual parameters can be modified and tested incrementally to determine if the bandwidth and quality requirements are met.

For each video stream, the Codec Type options are MPEG4, H.264 or MJPEG. MPEG4 requires the least amount of processing, and MJPEG requires the most.

Note

The MJPEG type is used for Video 2 and Video 3 for capturing snapshots and the Live Video feed respectively It is not possible to select a different type for these streams.

The Bit Rate parameter is only used when the Rate Control parameter is set to CBR (Constant Bit Rate). With the CBR setting, the system attempts to keep the resulting bit rate of the video at or near the target bit rate.

The I-Frame Interval parameter controls the number of P-frames used between I-frames. I-frames are full frames of video and the P-frames contain the changes that occurred since the last I-frame. A smaller I-Frame Interval results in higher bandwidth (more full frames sent) and better video quality. A higher I-Frame Interval number means fewer I-frames are sent and therefore results in lower bandwidth and possibly lower quality.

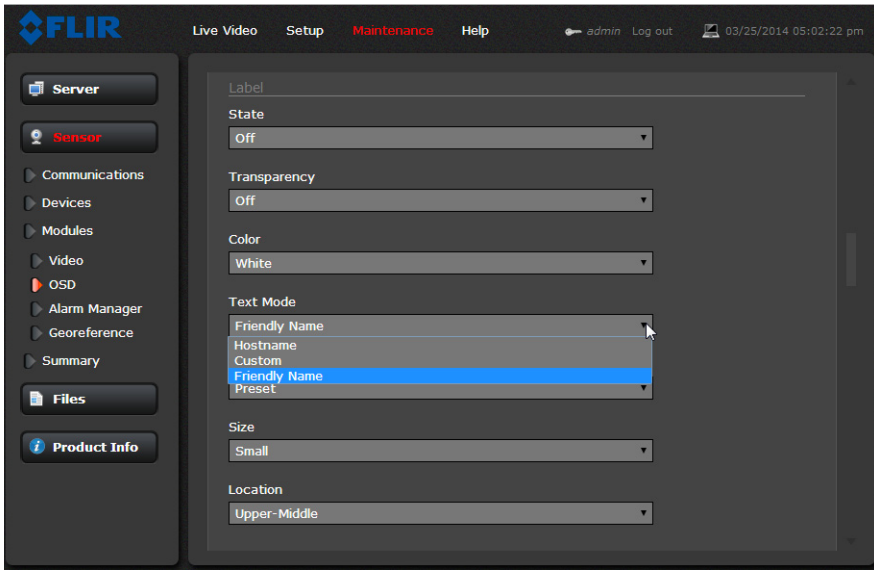
The Image Size parameter controls the video resolution size and therefore can have a considerable impact on bandwidth usage. The larger the size of the frame, the better the resolution and the larger the network bandwidth required. The following table provides the corresponding resolution for each Image Size setting.

Table 3-2: Image Size Settings

Image Size	NTSC	PAL
D1	720x480	720x576
4CIF	704x480	704x576
VGA	640x480	N/A
CIF	N/A	320x240
SIF	353x240	352x288
QVGA	320x240	N/A
QCIF	N/A	176x144

As a rule of thumb, if the video will be viewed on its own and on a reasonably large screen, a large image size setting may look better. On the other hand, if the video is shown as a tile in a video wall, a smaller image size may look as good and consume less bandwidth.

On Screen Display (OSD): Use the **OSD** page to turn on and configure the On Screen Display (OSD) options. It may be desirable to display text information (such as the name of the camera or the date/time) as an overlay on the video image. The OSD configuration page allows certain camera-related information to be displayed in the analog video and in the IP video streams. It is possible to display the following parameters as an overlay on the video channels: Date, Time, Label, Preset[1], Icon, Menu, Initial System Info, and Thermography Info (FC-Series R camera only).



The **Label** can display the Friendly Name (configured on the Product Info page), the Hostname (configured on the LAN Settings page) or a Custom text string (using the Text parameter after selecting Custom).

The appearance of each text string can be controlled with the following parameters:

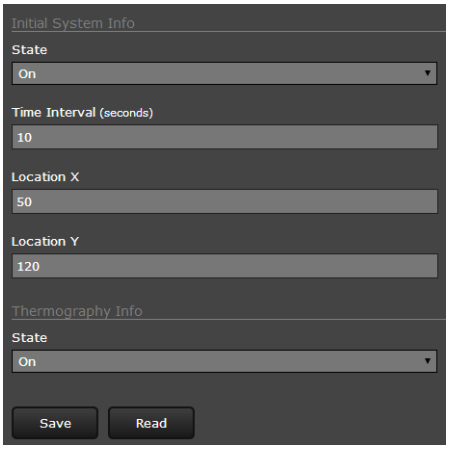
- State (on or off)
- Transparency (on indicates only the letters are displayed, off indicates the letters are displayed inside an opaque block)
- Color (changes the color of the letters)
- Style Mode (can be Preset, which indicates the information is displayed in certain preset sizes and locations, or Manual, which requires additional size and location settings)
- Size (text size - small, medium or large)
- Location (preset location on the screen where the information will appear)

1. The Preset label is generally used with FLIR pan/tilt cameras.

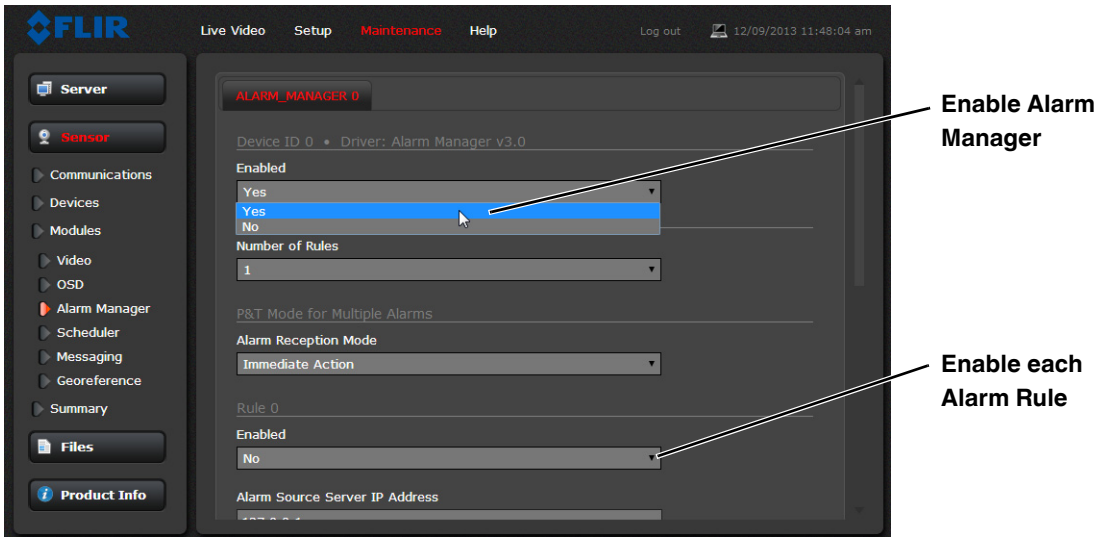
The **Initial System Info** parameters control how the initial system information is displayed, such as the IP address and Serial Number. By default this information is displayed on the video overlay (analog and IP) for 10 seconds.

The **Thermography Info** setting controls whether the Thermography OSD temperature readings are displayed on the video overlay (FC-Series R camera only).

The OSD text will appear on the IP video streams as well as the analog video output.



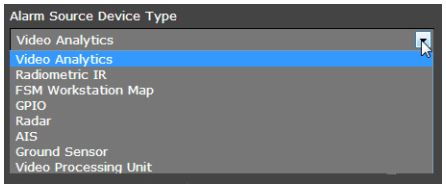
Alarm Manager: Use the **Alarm Manager** page to set the response and action that results from an individual alarm. It is possible to have more than one action for a single alarm by adding additional rules (for example, one action could capture an image and another could generate an output). The actions resulting from each alarm condition, may require defining Message Systems and setting up Notification Lists (refer to Services Menu, pg. 2-8) or using the Media Browser (Media Browser, pg. 3-24).



In general, each Alarm Rule describes an alarm **Source** and a single alarm **Action**. For the FC-Series camera, the source of the alarm typically will be internal from the camera itself, although it is also possible for the camera to receive alarms from another camera or device/server on the network (such as a radar server, input/output server, ground sensor, fence system, or other security sensor).

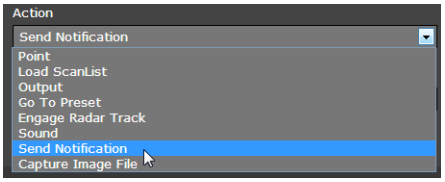
Alarm Source: The source of alarms for the FC-Series S camera is typically internal from Video Analytics and/or GPIO Input, while the FC-Series R camera also sources Radiometric IR alarms. In these cases, the Alarm Source Server IP Address is set to the localhost value of 127.0.0.1 and the TCP port is the default 1001. Otherwise the address and port are set to that of an external server. The FC-Series camera Alarm Source Device ID for alarms that are internal, is set to 0.

The **Alarm Source Device Type** is chosen from a pull down menu; not all options are available for a specific camera or installation.



When the alarm source is Video Analytics or Radiometric IR, the **Alarm ID** corresponds to the area or spot id, as configured in the Setup menu. When the alarm source is from the internal GPIO Input, the **Input ID** is set to 1. Video Analytics (0,1,2,3) and Radiometric IR (0,1,2,3) each have four alarms. The **Alarm ID** is set sequentially during the setup for each alarm source. Refer to Video Analytics Setup, pg. 3-4 and Temperature Monitoring Setup (FC-Series R camera only), pg. 3-7.

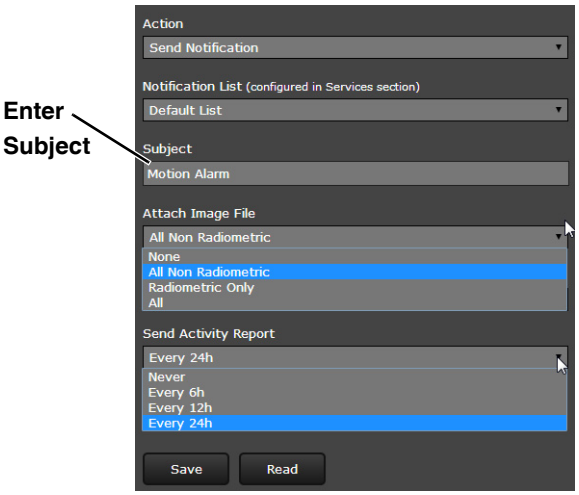
Alarm Actions: Just as there can be many sources of alarms, there are also a variety of responses or actions to these alarms. Some of the alarm actions are only used with pan/tilt cameras. Actions such as Point, Load ScanList, Go To Preset, and Engage Radar Track would only be used with a pan/tilt camera and are not used with the FC-Series fixed camera. For the FC-Series, typically a rule will be configured to Send a Notification, Capture an Image, or generate an Output on the GPIO device. An example of each one of these configurations is provided below.



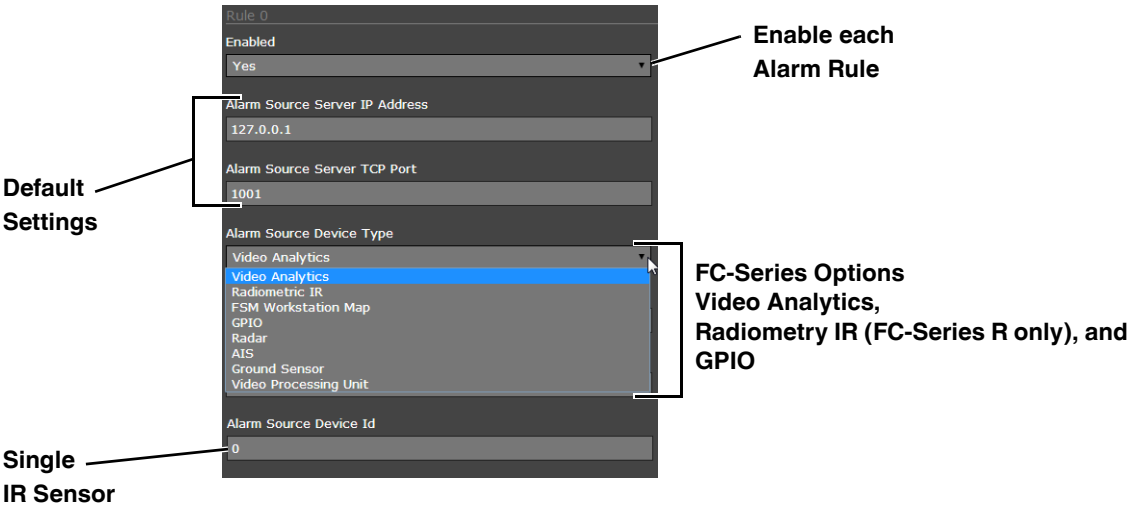
Selecting the **Send Notification** as the Action in the rule requires selecting a Notification List (Default List in this example) and that a Message System and a Notification List has been configured. Refer to Services Menu, pg. 2-8.

To attach a snapshot taken during the alarm, select **All Non Radiometric**—the FC-Series cameras do not take radiometric images.

Each rule that sends a notification also has the option to send an activity report to the same notification list every 6, 12, or 24 hours. The activity report indicates whether or not an alarm was triggered during the specified time period. Note that this can be selected on a rule by rule basis.



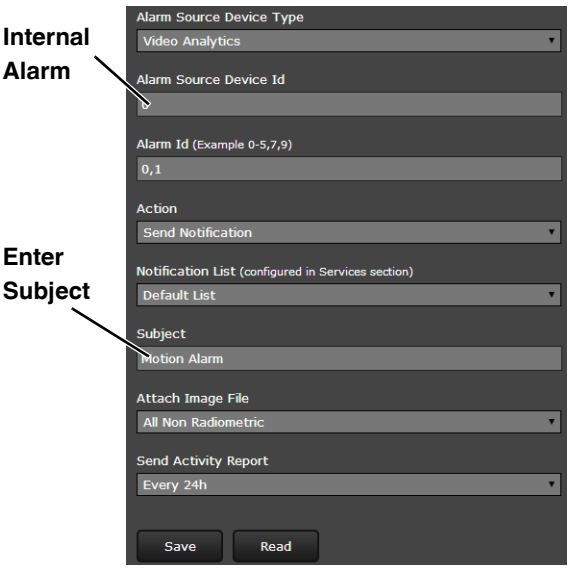
Alarm Rule Examples: The following examples show rules that control actions from alarms that are sourced internally from the camera. The first three lines and the fifth line of these rules are always the same as the alarm is coming from the FC-Series camera which is a single device (single IR sensor).



Video Analytics Alarm to Email: Shown at the right is an example of an alarm rule that causes an email notification (including a snapshot image) to be sent when a motion alarm occurs in VA Area 0 or 1 (refer to Creating Motion Detection Areas, pg. 3-5).

The Alarm Source Device Type is set to **Video Analytics** with Alarm Id **0,1** corresponding to VA Areas 0 and 1.

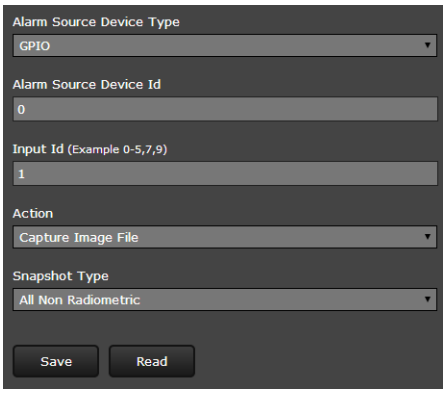
The Action, **Send Notification**, references the **Default** Notification List (refer to Notification Lists, pg. 2-9). When an email account is setup (Msg Systems, pg. 2-9), the Alarm Manager can attach a snapshot from the camera to an alarm email. Select **All Non Radiometric** for Attach Image File—the FC-Series cameras do not take radiometric images.



GPIO Input to Snapshot: Shown at the right is an example of an alarm rule that reads the GPIO input signal (refer to GPIO, pg. 3-14), then takes a snapshot and stores it in the Media Browser, pg. 3-24.

The Alarm Source Device Type is set to **GPIO** with Input Id **1** corresponding to the GPIO input.

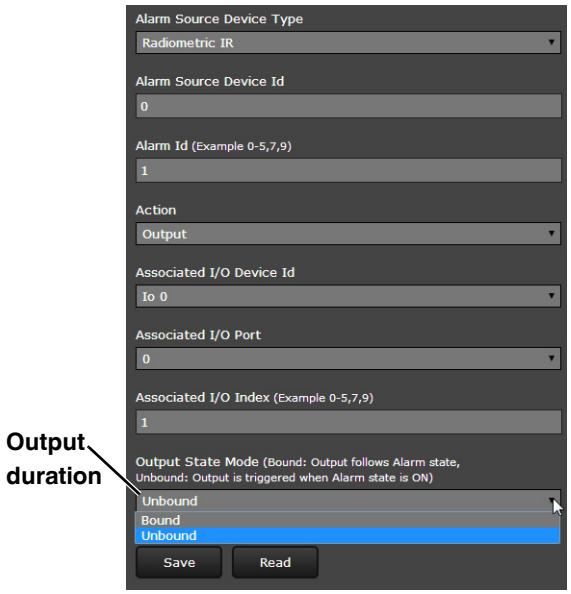
The Action, **Capture Image File**, takes a snapshot when the alarm occurs. Select **All Non Radiometric** for Snapshot Type—the FC-Series cameras do not take radiometric images.



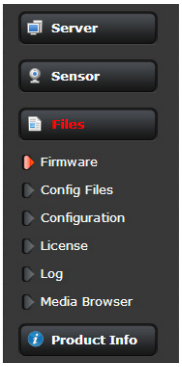
Radiometric IR Alarm to GPIO Output: Shown at the right is an example of an alarm rule that causes a GPIO output to be set when a Temperature Alarm is received (Alarm Id 1 from Radiometric IR is 1:SCR_SPOT on the Live Video page, refer to Live Video Page, pg. 2-3).

The GPIO Output State Mode can be set as **Bound** or **Unbound**. If **Bound**, when an alarm occurs, the output goes high and remains high until the alarm is cleared or the Output Reset Interval is reached (see GPIO, pg. 3-14).

If **Unbound**, when an alarm occurs, the output goes high and remains high until reset by the Output Reset Interval time-out or from a VMS (for example, from FSM using the IO Advanced panel).

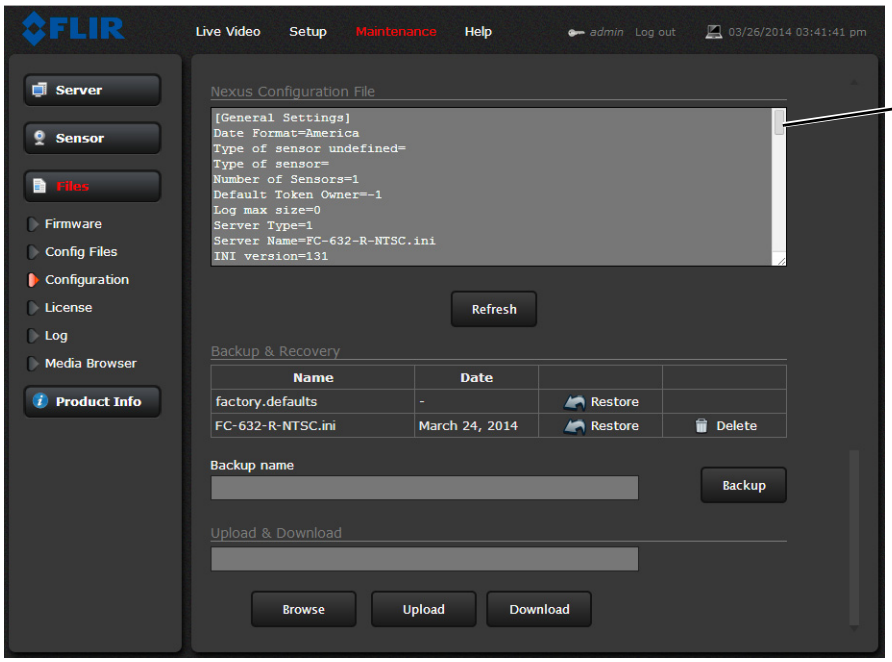


3.2.2 Files Menu



The **admin** actions for transferring files are accessed through the **Files** menu on the left side of the page. Selected actions from the **Configuration** and **Media Browser** are described below.

Use the **Configuration** page to see the Nexus Configuration File, perform Backup & Recovery of local files (on the camera), and perform Upload & Download of configuration files to another computer for backup, or to install a new configuration file to the camera.



Scroll down to see entire configuration

Shown at the top of the screen is the configuration script file in a scrollable window. This can be useful if help is ever need help from a support engineer.

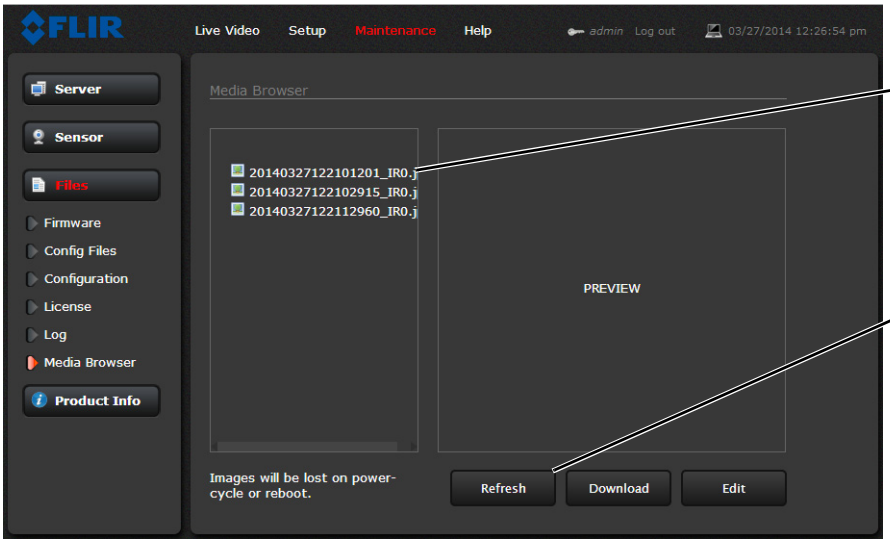
In the Backup & Recovery section, click the Restore link associated with the factory.defaults configuration to restore the camera to its factory settings. This file can not be modified or deleted, so it is always available.

Use the Backup button to make a backup of the final settings. This will make a backup copy of the configuration file and store it locally on the camera.

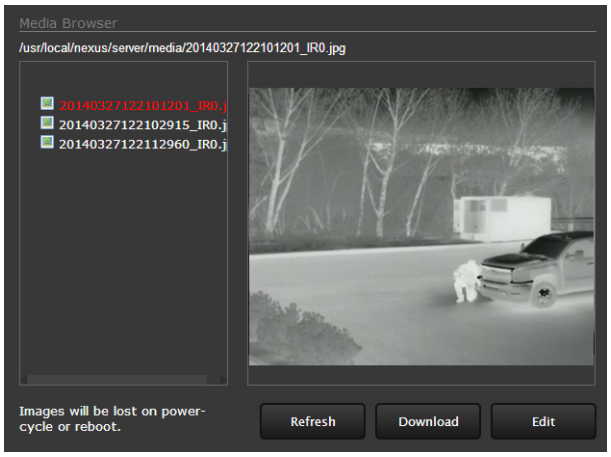
In the Upload & Download section, the Download link can be used to save a copy to a PC for safe keeping. A pop-up window will ask for a file name and destination folder.

The Upload button is used to transfer a configuration file from a PC to the camera.

Media Browser: The Media Browser page shows all of the images captured by the camera as a result of an alarm action. The image files can be downloaded to another computer for backup.



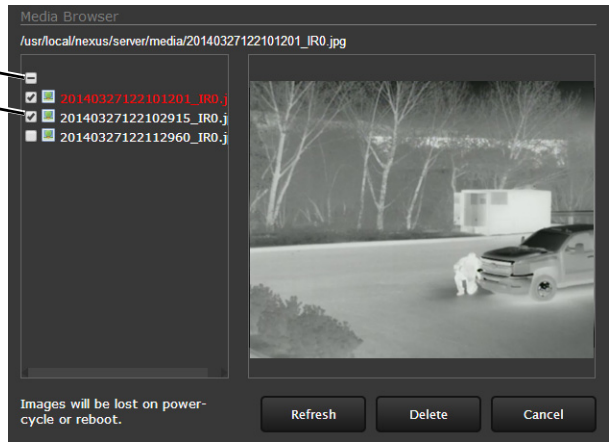
After selecting a file, the file will appear in the Preview window.



The file name contains the year, month, day, 24 hour clock time, and the sensor that captured the image. In this case IR0 is the only sensor.

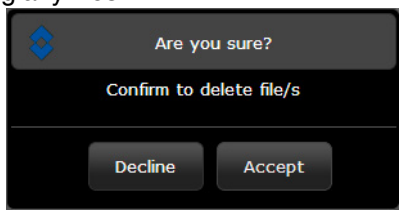
Select Download to download the selected file the PC. Select Refresh to check for any additional images since landing on the Media Browser page.

Select Edit to select and delete individual images or all images. Any time the camera is rebooted or the power removed, the media directory will be emptied.

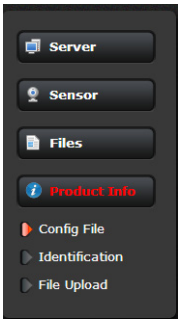


Select all media files by clicking on the Select All check box. If all files are not selected, the Select All box will have a minus sign.

The following prompt will appear prior to deleting any files.



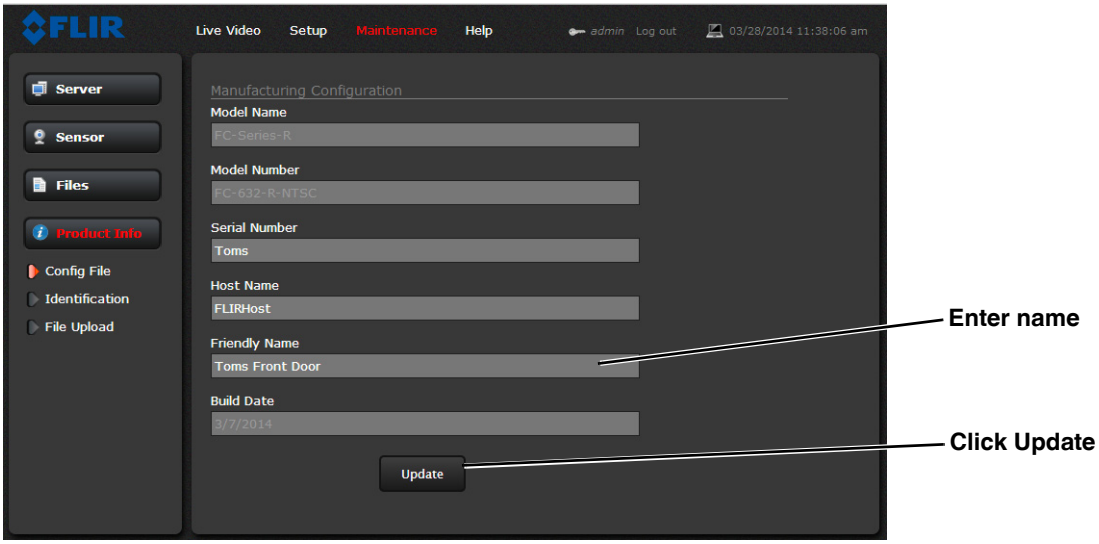
3.2.3 Product Info Menu



The **admin** functions accessed through the **Product Info** menu on the left side of the page are shown. Selected actions from the **Config File** page are described below.

Use the **Config File** page to change the Friendly Name which appears in FSM by default. You can also include the Friendly Name on the video feeds and adjust its appearance on the OSD page (refer to On Screen Display (OSD), pg. 3-18).

Click on the Update button to save the settings. The changes will not take effect until the server is stopped and started.



3.3 Restoring the Factory Settings

The camera comes configured from the factory with a default IP address (192.168.250.116), the login passwords (user, expert, fliradmin), and all of the other configuration parameters (stored in a file called server.ini). In some cases, it may be necessary to restore the network settings of the camera to the original factory settings. If necessary, the camera IP address can be restored to this factory default address by temporarily connecting a loopback device to the Ethernet port during initial power-up (this can be accomplished by using conventional power rather than PoE+). Approximately 30 seconds after power is turned on, the loopback device should be removed to allow the camera to finish booting up.

Note

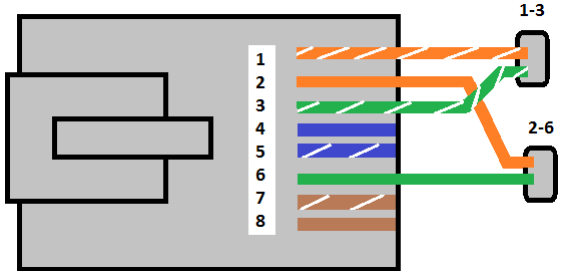
The camera will not finish booting up while the loopback device is connected to the camera. The camera will display analog video, but the Nexus Server will not start until the loopback device is removed from the camera.

At each power-up, the system transmits a packet and then checks to determine if that same packet has been received. Detection of the received packet indicates the camera has a custom loopback connector installed on its Ethernet interface. The detection of the loopback packet cues the camera to restore Factory Defaults (including the IP settings, user passwords, and configuration file), and to revert to the same configuration and behavior as when the camera left the factory.

The custom loopback connector is described below.

Pin #	Signal	Tied to pin #
1	Transmit +	3
2	Transmit -	6
3	Receive +	1
4	Unused	N/A
5	Unused	N/A
6	Receive -	2
7	Unused	N/A
8	Unused	N/A

The RJ45 loopback termination ties pin 1 to pin 3, and pin 2 to pin 6. The other pins are not connected. This type of device is available commercially (the Smartronix Superlooper Ethernet Loopback Jack and Plug is one example), or it can be easily made with an RJ45 plug, a couple wires, and a crimp tool.



After the camera boots up, confirm the startup information is displayed on the analog monitor after approximately 90 seconds. For example:

```
S/N: 1234567
IP Addr: 192.168.250.116
```